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THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN, THE NATIONAL IRONFOUNDING EMPLOYERS' FEDERATION, THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES' EQUIPMENT AND SUPPLIES ASSOCIATION.

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The Conference Papers.

We have from time to time had occasion to criticise the Exchange Papers presented by the overseas associations to the Institute of British Foundrymen. We do not think, however, that there will be any cause for criticism this year. The American Paper by Mr. Coyle and the German Paper by Dr. Pfannenschmidt conform admirably to the type of Exchange Paper which summarises recent developments in their respective countries by authors who have personally contributed to those developments. They summarise so much work that discussion on them is not easy. The French Paper is also an admirable example of another type, which presents a development relating to time study in the foundry in a way which is bound to stimulate other foundrymen to consider how far the same principles can be elaborated elsewhere.

To those who may feel disappointment that there is no Paper, for example, dealing with steel founding and only one comparatively specialised Paper on non-ferrous practice, we would say that the foundry field is a very wide one, and we cannot expect that all phases of it can be dealt with in any one year. There is little to be gained by forcing the production of Papers to suit a predetermined programme. On the contrary, we should be prepared to argue that a Paper should only be written when there is something new to be said. This naturally results in gaps in the programme year by year. Should there be over a period of years an obvious lack of subject matter on one section of the field something might be done to fill it. We would also point out that the non-ferrous founder and the steel founder are in their respective ways equally as interested, for instance, in the question of moulding sands and metallurgical coke as is the grey iron founder. On both these subjects Papers were presented, and taking the programme as a whole it was probably as balanced as any programme could be expected to be. The expressed willingness of the Institute to receive Papers on any subject within its field would do all that is necessary to ensure the completest possible balance in future. The situation is very similar to that which gives rise to the old complaint about the scarcity of practical Papers. That is really due to the scarcity of men able and willing to write them. They would be sure of a warm welcome if they were written.

The Cardiff Conference.

The Institute of British Foundrymen, and indeed the whole of the foundry industry, can congratulate themselves on their choice of Mr. C. Edward Williams as their leader for the coming year. It is pleasing to a national gathering such as was assembled in South Wales to have it impressed upon them so strongly that their nomination related to a gentleman who was held in such high esteem locally. The attendance was much on the same level as that recorded for Newcastle, but an additional pleasing feature was the presence of two honorary corresponding members of council from abroad, Mr. A. H. Moore, of Benoni, South Africa, and Or. Guido Vanzetti, of Milan, while the return of Mr. Oliver Smalley after ten years' absence in the States was particularly welcome as the unique position he holds in that country makes his statements of a technical character, especially authoritative.

A feature of foundry conferences in Britain is the genuine appreciation shown by the back benchers in the work done by the officers and staff of the Institute. This is no doubt due to such a large percentage of members who in various capacities contribute their quota to its well-being and progress. This enthusiasm was well deserved, as the organisation was extremely well thought out and brought into effect, and members were particularly appreciative of the efforts which had been made by the newly elected President, Mr. C. E. Williams; Mr. J. J. McClelland; Mr. W. Williams; Mr. W. E. Clement and Mr. S. Rawdon. A particular debt of gratitude is due to the British (Guest Keen Baldwins) Iron & Steel Company; John Williams & Sons (Cardiff), Limited; Brown Lennox & Company, Limited; Powell Duffryn Steam Coal Company; W. D. & H. O. Wills, Limited, and the Bristol Aerodrome for their kindness in throwing open their works for inspection and for the entertainment they so graciously offered.

The social side of the Conference was admirably catered for, and the receptions accorded by the civic and University authorities were well attended, providing ample opportunities for what the Americans describe as "getting together." In addition, the visitors, as is their custom, held impromptu parties in their hotels after the official functions had finished. While no real organisation exists for their promotion, we can assure the leaders that their efforts are appreciated by their fellow members, and already many are looking forward to more "cabaret" performances next year. The excursion up the Wye Valley was excellently arranged and much appreciated by those who had the good fortune to extend their stay until the Friday. The movement now under consideration to move Conferences a day later would help to popularise the excursions held on the last day.

XUM

A Popular Works Visit.

One of the most popular visits organised in connection with the Cardiff Conference was to the blast furnaces of the British (Guest Keen Baldwins) Iron & Steel Works.

These works, right on the sea shore and within easy reach of the Great Western Railway main line, cover an area of about 83 acres and possess one of the most modern blast-furnace plants, comprising an ore-crushing plant, sintering plant, blast furnaces which are giving consistently remarkably high output figures, and a pig-iron continuous casting machine.

Ore boats are unloaded at the Company's wharf by cranes and grabs worked by hydraulic and by electrical power supplied direct by the works. The wharf is connected with the works by a subway with double lines running direct to the ore-crushing plant. This plant reduces all ores and limestone to normal size before passing to the blast-furnace bunkers. The screening plant separates the fines during the dressing and crushing process and discharges them into wagons which are sent to the sintering plant. The primary crushing is carried out by three heavy jaw crushers of the Hadfield type, and the material then passes directly through disc crushers of the Hadfield Hecla type and is sent to the hoist, raised to the gantry over the bunkers, and discharged.

At the sintering plant, the fine ore and the coke breeze necessary are prepared by passing through electrically-operated crushers and screens which "normalise" the grade of the mixture, which is then passed to conveniently placed storage bunkers. The material is conveyed by belting and automatic feeds to a mixer from which it passes to the feeding bunkers of the sintering pans, where it is ignited and sintered. There are 12 sintering pans in which the roasting is controlled by specially designed electrically-operated suction fans which discharge the fumes to a tall steel chimney. The sintered material is classified—the fines being removed and the heavy material discharged into steel hopper wagons which are then sent to the blast furnaces.

The blast furnaces have been completely reconstructed within the last four years, and are equipped with the latest "Mackee" type top and Brassert design of electrically-operated hoist equipment. The most recently built furnace, No. 4, with a hearth diameter of 16½ ft., is entirely electric automatically controlled from one master control. There are three blast furnaces and nine hot blast stoves 24 ft. in dia. and 90 ft. high fitted with modern automatic Steinbart gas burners.

The rough cleaning of the blast-furnace gas for use in boilers and stoves is carried out in two Brassert gas-cleaning towers of the wet type which are capable of dealing with 5½ million cub. ft. of gas per hr. The water used in these towers is passed through a Dorr Thickener for extracting the sludge and clarifying, and is returned to a cooling tower plant and used over again in the towers.

All iron under ordinary conditions is conveyed to the steelworks or to the pig-casting plant in 60-ton mixer type ladles which are tilted electrically. Three sand beds in front of the furnaces can be utilised in the event of any failure at the pig-casting plant. This plant consists of the latest Brassert continuous pig-casting machine, and is of the two-strand type capable of dealing with 800 tons of pig-iron per day. From the machine the pigs are discharged direct into wagons. The blast-furnace slag is tipped from ladles on to the foreshore.

Other works will be dealt with subsequently.

Iron Oxides.—The thermal properties and heats of formation of the various oxides of iron are reviewed by J. Chipman and D. W. Murphy in the Industrial Edition of "Industrial and Engineering Chemistry."

Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

The Cardiff Convention.

To the Editor of The Foundry Trade Journal.

Sir,—May we trespass upon your generosity by asking if you will be so good as to allow us a little of your space to thank one and all who subscribed to the Conference Fund raised in connection with the Institute of British Foundrymen's Annual Convention held in Cardiff last week?

Our friends were numerous. Without their help we could not have done so much to make the Delegates and their ladies happy and we do want them to know that this help was very much appreciated by the whole Branch and also by those who attended the Conference.—Yours, etc.,

C. E. Williams,
President of the Institute of British Foundrymen.

J. J. McClelland,
Hon. Conference Secretary (Cardiff).

June 24, 1933.

Wm. Beardmore & Company, Limited.

FIRST DEBENTURE MORATORIUM SCHEME.

A meeting of the holders of the 7 per cent. first mortgage debenture stock of Messrs. William Beardmore & Company, Limited, was held on June 27 to consider a scheme for a moratorium in regard to interest and sinking fund payments on the stock. In a circular to the debenture holders the directors stated that: "In common with all other undertakings of a similar character, the company has suffered to a serious extent from the world-wide industrial depression, with the result that its financial resources have been seriously diminished. Fortunately the company has recently been able to secure an increased volume of work, a very large proportion of which is represented by Admiralty contracts. The directors, however, are satisfied that unless the company can obtain some relief from the payment of interest and sinking fund instalments on its debenture stock it will be unable to finance the work in hand, the results of which, it is hoped, will enable the company to maintain its organisation in such a position as to obtain and carry out other orders as opportunities arise, and so gradually improve its situation. It must be borne in mind, however, that there must be an improvement in the iron and steel trade before hopes can be entertained of any material growth in the volume of general orders. In the circumstances the directors have consulted the holders of a large majority of the first mortgage debenture stock, who have agreed to support proposals for a moratorium in respect of the interest and sinking fund payments."

Under the scheme, which was accepted by the debenture holders, interest falling due up to and including December 31, 1934, and—at the discretion of the trustees for the stockholders—up to and including December 31, 1935, will be payable only out of profits. Any interest remaining unpaid will carry interest at 5 per cent. The sinking fund is to be suspended until July 1, 1936, and the date of redemption of the stock is extended from December 31, 1951, to December 31, 1954.

Dorman Long—South Durham Fusion.

The following statement has been issued by Messrs. Dorman, Long & Company, Limited:—"The Court has now issued its directions for calling the necessary meetings for the purpose of considering the scheme for the amalgamation of Dorman, Long & Company, Limited, with the South Durham Steel & Iron Company, Limited, and the former company is arranging to post the details of the scheme to the debenture stockholders and shareholders on the night of July 3."

Random Shots.

Conferences come and conferences go, but the Geekayeffaitch—a Welsh combination cabaret show—goes on for ever, at least until the crack of dawn. Just what the connection is between muffins, blackbirds and foundries, "Marksman" has yet to discover. The general query was when and where do these lads practise to attain such proficiency in both the balancing and the consuming of their "props" for their show? The Americans also stage some sort of drama at their conferences, which has a moral—generally something to do with costing and depression. "Marksman" found no trace of depression in Cardiff, and he counted the cost on return. He would back our cabaret against their drama as a gloom-dispeller any day!

* * *

Thursday afternoon was a spot exciting. It started with the Severn tunnel and a temporary failure of lights. I discovered that I was not the only marksman, and several random shots got a bullseye. In the melée I nearly got a black eye. I do protest, however, that when serious efforts have been made by likely lads and lassies to make themselves comfortable during the hazardous passage beneath the mighty Severn, they should not be subjected to raids by undisciplined bandits, who had not the *savvy* to arrange their programme is advance. Besides, even in the best of foundry circles one may be the ignominious possessor of a pet corn!

* * *

On Guides and Guiding.

Guides by nature divide themselves into three classes: Policemen, professors and guardian angels. The first type apparently does not exist in South Wales and the West of England; the second classification was encountered at every works visited except where providence had created the third type. At one works the erudition of the guides was such that *sub rosa* competitions were organised to "floor" them, and this was only accomplished by a highbrow from one of the research organisations. The guardian angels were discovered at the tobacco factory. Never have foundry experts been favoured with such a bevy of beauty, brains and charm to act as their chaperones. And it was nice to have tea with them.

* * *

Most people missed *the* speech of the Conference. It was, as should the *pièce de resistance*, be left to the very last. It was a Victorian reminiscence by Mr. McClelland, who, referring to his courtship days, said that, owing to the dress at the time, one had to take the ladies at "face" value. Times had, like cricket, changed, and now it was a case of either "leg theory" or "body line." Mr. Roy Stubbs, after much arduous study, taking him into the early hours of the morning, made a little speech in Welsh. This was translated by Mr. W. E. Clement as meaning "beware of the Ship Canal," which reminds me that I, too, once made a howler at college. I translated *Cave canem* as "Beware, I may sing!" As this really does refer to a dog, it must have been the one true origin of a schoolboy "howler."

Marksman.

INSTITUTE OF BRITISH FOUNDRYMEN.

THIRTIETH ANNUAL CONFERENCE AT CARDIFF.

The first official function at the Conference was a Civic Reception at the City Hall, Cardiff, by the Right Hon. the Lord Mayor (Alderman C. F. Sanders, J.P.) and the Lady Mayoress (Miss Muriel Sanders), on Tuesday evening, June 20. Mr. Victor Stobie (the retiring President of the Institute) and Mr. C. Edward Williams (Cardiff), the President-elect, and Mrs. Williams were with the Lord Mayor and Lady Mayoress to receive the guests, who included members of Mr. Williams' family and Mr. W. E. Clement (President, Wales, Monmouthshire and West of England Branch); Mr. William Williams (Chairman of the Conference Committee and Immediate Past Branch-President) and Mrs. Williams; Mr. J. J. McClelland (Hon. Branch and Conference Secretary) and Mrs. McClelland.

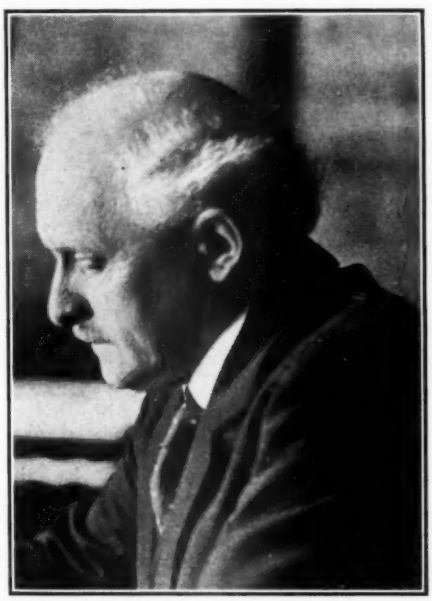
A Civic Welcome.

On Wednesday morning, June 21, the members assembled in the Lecture Theatre of the South Wales Institute of Engineers, Park Place, Cardiff, when the Lord Mayor, together with Mr. J. F. Rees, M.A., M.Com. (Principal of University College of South Wales and Monmouthshire), and Mr. D. Morgan Rees, J.P. (President, South Wales Institute of Engineers), joined in welcoming the visitors to the city. Mr. Victor Stobie (Retiring President of the Institute) occupied the chair during the earlier part of the proceedings.

The LORD MAYOR said that he had been fortunate in having the opportunity on the previous evening of meeting many of the members and their ladies, and was particularly pleased to find that they had discovered that Cardiff was not exactly as they had pictured it. They had arrived, no doubt, with certain expectations, in regard to some of which they had been absolutely disappointed; he hoped he might say that they had discovered something which was rather above their expectations. He hoped they would stay long enough to see something of the outside as well as the inside of the city. Cardiff was a city not to be despised. The district was a mining district, but the mines were not kept in the main streets and had not really disfigured the country around Cardiff; one had to travel some distance from the city before one would find heaps of rubbish, which in his view ought not to remain as they were, external to the surface; something ought to be done in regard to their disposal, and if they could not be thrust out of sight altogether they might at least be covered, as he was glad to find was being done in many places, and converted into parks. In some parts of South Wales the unemployed had done it voluntarily, with wonderful results.

Though he had had the opportunity of welcoming the members on the previous evening, he was glad to welcome them again in another sense, for on this second occasion they had assembled, not to be entertained, but in order to do their work. Somebody great had said quite recently what he had been feeling all his life, that work was the best play, that it was really the most amusing thing in our lives if we went about it properly; if we had a real interest in our work it was a joy to be doing it.

He had been wondering how near the craft of the foundrymen was to being the oldest craft in the world. Presumably, the gardener had come first—and he had made some mistakes—(laughter)—but history told us that workers in metal were among the very oldest craftsmen; they were still pursuing that craft, with very great advantage to the community. The community could not do without them, or at least he did not know what the community would do without the help of those who produced the various metals which were rendering such excellent service in many spheres. We were learning more and more how metals could be substituted for other material which had been used in the past. One of the directions in which it was hoped that the industries of the Cardiff district would revive was that of using metal instead of wood wherever that could be done, partly, perhaps, because our stocks of timber were not so great, comparatively speaking, as they were in former years, so that we had to rely more and more upon other countries for supplies of timber.



MR. C. E. WILLIAMS

(The newly-elected President of the Institute of British Foundrymen).

MR. C. E. WILLIAMS was born in 1866, his father, the late Mr. Lewis Williams, J.P., being chairman of the Cardiff School Board during the entire existence of School Boards. Mr. Williams was educated at the Manor House School, Clapham, the Leys School, Cambridge, and the South Wales University College, which he entered in 1883 as its first student. He joined the firm of John Williams & Sons in 1884, and became manager of the Globe Foundry & Engineering Works, Cardiff, in 1887. The Globe Foundry was incorporated with John Williams & Sons (Cardiff), Limited, when that company was formed in 1899. Mr. Williams is chairman of the board of directors of John Williams & Sons (Cardiff), Limited; Williams (Barry), Limited; Emery Bros., Limited, Birmingham, and also a director of the Principality Building Society, Cardiff. He has been the President of the Cardiff and District Master Ironfounders' Association for about 33 years, and his services were recognised by the presentation of his portrait in oils on the occasion of a complimentary dinner. A second local activity is that he occupies the position of treasurer of the Cardiff Blind Institute.

If we could substitute iron for wood it would be a good thing for the foundry trade and a good thing for the coal industry, with which Cardiff was specially concerned. He had sufficient interest in these matters to be happy to welcome the members of the Institute and to wish them success in their deliberations.

The Lord Mayor also expressed his great pleasure that the Institute was honouring an old citizen of Cardiff, Mr. C. Edward Williams, by electing him President—(applause). Mr. Williams was the son and the grandson of Cardiff citizens, both of whom it had been a pleasure to meet. The Lord Mayor was happy to be able to say that he had known Mr. Williams' grandfather and father very well; the latter had carried out a great deal of educational work and had made a great contribution to industrial progress in the city. In every way the family of Mr. Williams had been doing their bit very thoroughly and very well for many years past, and the fact that Mr. C. Edward Williams was to be President of the Institute would give pleasure to a great many Cardiff citizens. The Lord Mayor wished him a happy year of office, followed by many happy years of retirement, and that he would in due course retire with laurels upon his brow and with joy in his heart by reason of the work he had accomplished.

Vote of Thanks to the Lord Mayor.

MR. VICTOR STOBIE (Retiring President) proposed a hearty vote of thanks to the Lord Mayor for the delightful reception which he and the Lady Mayoress had accorded the members on the previous evening, and for his happy words of welcome. Commenting upon the importance of the City of Cardiff in the business of the country, Mr. Stobie said that something like one-third of the whole of the coal shipped from British ports was shipped from Cardiff; the fact that Cardiff had maintained such a hold on the trade, bearing in mind the existence of Newcastle and other coal-exporting places, was evidence of the wonderful enthusiasm of the City and the Corporation.

MR. F. J. COOK (Past-President), seconding the vote of thanks, said that the knowledge of his own limitations did not deter him on this occasion, by reason of the fact that words of his were not really necessary to commend the resolution to the members, and that it would be acclaimed in any case. However inadequately he might express himself, there was no doubt whatever as to the sincerity of the members in expressing their thanks.

The vote of thanks was carried with acclamation.

The University College.

MR. J. F. REES, M.A., M.Com. (Principal of University College of South Wales and Monmouthshire), who joined in the welcome to the members, said it was fitting that they should be welcomed both by town and gown, by City and College. That association in Cardiff had been very intimate for a period of 50 years, and the College would be celebrating its jubilee this year. In the course of some research which had been conducted for the purpose of writing a history of the College, it had been discovered that for twelve months after its foundation it had been carried on, not under Royal Charter—because it was then negotiating for the Charter—but under a resolution of the Town Council of Cardiff. Thus the College had been connected very intimately with the Cardiff Corporation throughout, and had been very much a town's College from the beginning.

From the point of view of the University College there were two reasons why it was most appropriate that the Institute should be holding its Conference in Cardiff this year. One was that the Professor of Metallurgy at University College, Prof. A. A. Read, was retiring, having

reached the age of 65 years. Thus the Conference was being held at the end of an important period in the history of the Metallurgical Department of the University College. The second appropriate circumstance was that the Institute was electing as its President Mr. C. Edward Williams, who was the first student named in the Matriculation Register of the College 50 years ago. That Register had been found among the archives of the College, and on the occasion of the Reception at University College on June 22 the Register would be exhibited in the library, and in a glass case; it would be strongly guarded, because it was feared that the Institute might like to have it as a memento. The Register would be opened at page 1. The College building would also be open for inspection on that occasion.

The South Wales Institute of Engineers.

MR. D. MORGAN REES, J.P. (President of the South Wales Institute of Engineers), said that he was glad of an oportunity to express a word of welcome from one technical society to another. He was delighted that the Institute of British Foundrymen had made Cardiff the venue of its annual meeting this year, and he felt sure that the visitors would feel at home in the building of the South Wales Institute of Engineers, for its emblem and motto was engraved in the entrance hall, and it included a blast furnace. The Institute's motto was "Rhoddais i ddyn adenydd yr eryr," which meant "I give to man the wings of the eagle." The South Wales Institute of Engineers, he continued, was established in 1857 by a few public-spirited men of the district, and its first President was Mr. William Menelaus, a man of international repute. Its objects were the encouragement and advancement of engineering science and practice, and at its meetings Papers were read on a variety of subjects, including the economic and safe working of mines, industrial diseases, and so on. The membership was about 1,200 and the area covered by the Institute comprised the whole of South Wales, Somerset and the Forest of Dean. As the result of the generosity of certain members, scholarships were awarded, and the Institute itself, by conserving its resources, was able to give six scholarships a year, the candidates for which had to pass stiff examinations by independent examiners. The Institute had also a fairly substantial Benevolent Fund; under the present depressed industrial conditions there were many claims upon the Fund, but the Institute was happy to be able to relieve some of the distress. After congratulating Mr. C. Edward Williams upon his appointment as President of the Institute, Mr. Rees recalled the battle concerning the sites for University College more than 50 years ago, and said that Mr. Williams' father, Mr. Lewis Williams, and Dean Vaughan went to London as the representatives of Cardiff to plead the cause. Those who remembered Mr. Lewis Williams' gifts of speech would appreciate that his advocacy must have been irresistible. The people of Cardiff, and particularly the younger people, owed a very great debt to Mr. Lewis Williams in that respect.

Presentation of the Oliver Stubbs Gold Medal.

It was announced by Mr. Stobie, amid prolonged applause, that the Oliver Stubbs Gold Medal (which is awarded each year to a member of the Institute for meritorious work) was to be presented to Mr. J. W. Gardom for the year 1932-33. Mr. Gardom had carried out much excellent work on the Technical Committee of the Institute, of which he was convener. Those who had seen the Institute's technical exhibit at the recent International Foundry Trades Exhibition in London would agree that only the most enthusiastic of leaders could have produced such a result, with his band of co-workers. The Institute appreciated not only the work that was put into the preparation of that exhibit, but also the real intellect behind it, and as the result of it the Institute had secured 32 new members.

The LORD MAYOR, in presenting the medal to Mr. Gardom, congratulated him upon being one of those pioneers who were leading the world to even greater successes than had been achieved in the past.

MR. GARDOM, returning his thanks, said it had been a real pleasure to work with the Technical Committee, and his recent experience had given him an entirely new outlook on life with regard to work which previously he did not like. He hoped the whole of the members of the Technical Committee would feel as he did, that he was accepting it on behalf of them all.

A New Award.

MR. STOBIE intimated that the Council had decided upon making a new award as a recognition of meritorious work over long periods, a work of a different nature from that for which the Oliver Stubbs Medal was awarded. Inasmuch as the decision was come to only on the previous day, the Council had not had time to prepare an emblem. It was probable that it would be in the form of a silver medal, and it had been agreed that number one on the list of recipients should be Mr. F. W. Finch, the father of the Institute. Under the circumstances the award could not be made on this occasion, but the Lord Mayor had kindly consented to congratulate Mr. Finch.

The LORD MAYOR, in congratulating Mr. Finch (and bearing in mind that Mr. Finch had reached the age of 87 years), said that he personally was one of those old-fashioned old fogies who still considered that age and experience counted for something. He did not say that because he was achieving rather a record himself in that direction, but throughout his life he had noticed that old men had been able to do a great deal. Mr. Finch had obviously rendered yeoman service during the long period in which he had been associated with the Institute, and it was fitting that he should be the first recipient of the new honour.

MR. FINCH (who was received with prolonged applause) recalled that when he had started the Association, as its first hon. secretary, the membership had numbered seven, but it had since grown to 1,900. The honour was one which he accepted with pride, for he claimed to be the oldest member of the Association, and to have paid the very first subscription, the money being devoted to the printing of the circulars which had to be distributed at that time.

Vote of Thanks.

MR. STOBIE, proposing a vote of thanks to Mr. J. F. Rees and Mr. D. Morgan Rees for the welcome they had extended to the Institute, said it was indeed a pleasure to find that there was such intimacy in Cardiff between the town, gown and technical societies. The Metallurgical Department of University College had done some splendid work, as had also the Departments of Engineering, Chemistry and Physics. The Institute of British Foundrymen was indeed indebted also to the South Wales Institute of Engineers, and would like to express to Mr. Morgan Rees sincere thanks for having placed at the disposal of the visitors such a delightful building in which to hold their meetings.

The vote of thanks was seconded by MR. C. EDWARD WILLIAMS (President-elect) and carried with enthusiasm.

Visitors from Overseas.

MR. STOBIE extended a hearty welcome to Dr. Guido Vanzetti (Italy) and Dr.-Ing. C. W. Pfannenschmidt (Germany).

DR. VANZETTI said that he was attending the meeting as a member of the Institute and also as the official representative of the Federation of Italian Metallurgical and Mechanical Industry, in which the Italian foundrymen were organised, and on behalf of Italian foundrymen he extended to the British Institute very sincere greetings and best wishes for a successful Conference. He was indeed happy to be able to attend these Annual Conferences in England because he appreciated so highly how important it was that foundrymen of various countries should meet and exchange ideas. It was the only way in which they could improve to the greatest extent their efficiency and their productions, and they could not remain in their own little shells; they must all appreciate what other people were doing and make comparisons with their own work. Dr. Vanzetti also expressed his appreciation of the honour done him by the Institute in electing him Hon. Corresponding Member in Italy; he appreciated it not so much as a recognition of his own merit but rather as recognition of the work of his late father (Mr. Carlo Vanzetti, C.B.E.), whose work in cementing together good relations between foundrymen internationally he would endeavour to continue.

MR. STOBIE thanked Dr. Vanzetti for the friendly greetings he had conveyed from Italian foundrymen, and asked him to be good enough to return friendly greetings to his Italian colleagues.

Among others from overseas who attended the Conference were Mr. Oliver Smalley, who has been a member of the Institute for many years but has been resident in the United States for the last ten years; and Mr. Marks, also a visitor from America, and who had in the past presented Papers to the Branches of the Institute. On behalf of the President and the whole of the membership, the secretary (Mr. Tom Makemson) offered a very hearty welcome.

Greetings from Foundrymen's Associations Overseas.

The SECRETARY read telegrams of good wishes which had been received from the French Foundry Technical Association and the Czecho-Slovakian Foundrymen's Association. Telegrams reciprocating these good wishes were forwarded from the Conference.

A cable was sent from Cardiff to the American Foundrymen's Association, which was holding its Conference in Chicago, and in the course of the meeting a cable was received from America reciprocating these good wishes.

Messages of good wishes and apologies for absence were received from Mr. W. R. Lysaght (President, Iron and Steel Institute); Sir Henry Fowler (President, Institute of Metals); Mr. J. Cameron; Mr. J. T. Goodwin; Mr. S. H. Russell; Mr. R. O. Patterson and Mr. F. P. Wilson, all Past-Presidents of the Institute.

ANNUAL GENERAL MEETING.

The business of the annual general meeting of the Institute was then proceeded with. Mr. Victor Stobie (Retiring President) was in the chair.

On the motion of MR. V. C. FAULKNER (Past-President), seconded by MR. J. S. G. PRIMROSE, the minutes of the preceding annual general meeting were confirmed, and were duly signed.

Council's Report.

The motion for the adoption of the General Council's Report for the Session 1932-33 was proposed by the RETIRING PRESIDENT and seconded by MR. R. A MILES. The Report was adopted without discussion.

ANNUAL REPORT.

This report covers the period of twelve months ended April 30, 1933, and the accounts are for the year ended December 31, 1932. In addition to the usual programme of work for the service of its members, the Institute's policy in recent years has been to undertake work of value to the foundry industry as a whole. These wide activities have been continued and extended during the past year, partly through the Technical Committee and the educational interests of the Institute, and partly by co-operation with

other technical organisations. The year has been one of the most active and fruitful in the Institute's history, and much work of value to the members and to the future of the industry has been accomplished.

Membership.

The General Council regrets to report, for the first time since 1924, a slight decrease in the membership. This is mainly in consequence of the expunging from the roll of membership of members who were seriously in arrear in payment of their subscription, though the Council has not deleted the name of any member where the difficult industrial conditions are the cause of the arrear. A more live roll of membership exists as a result of this survey. There are certain losses by death and by resignations, and there is an excellent addition of new members.

The changes of membership and the present membership are analysed in the following tables.

TABLE I.—*Changes of Membership.*

	Subscribing firms.	Members.	Associate members.	Associates.	Total.
At April 30, 1932..	47	741	982	149	1,919
Losses and transfers to other grades	7	59	108	28	202
	40	682	874	121	1,717
Additions and transfers from other grades ..	9	66	88	14	177
At April 30, 1933..	49	748	962	135	1,894

Finance.

The Income and Expenditure Account shows a loss of 6s. 3d. on the year's working. The cash at bank, £489 18s. 1d., includes a sum of £277 8s. 4d., which has been transferred from the accumulated funds of the Branches. The bulk of the money so transferred has been invested in securities since the accounts were made up on December 31.

Deaths.

The Council deeply regrets to report the deaths during the year of the following members, several of whom have held office in the Institute:—

MR. JOHN LITTLE. President of the Institute in the year 1919, and previously President of the Sheffield Branch. He died at Southport in September, 1932.

MR. THOMAS BELL. President of the Scottish Branch in the year 1927.

PROF. HUMBOLT SEXTON died at St. Helier, Jersey. He was for many years Professor of Metallurgy in the Royal Technical College, Glasgow, and was an Honorary Life Member of this Institute.

MR. H. G. SOMMERFIELD died suddenly in January, 1933. At the time of his death he was President of the London Branch, of which he had previously been Honorary Secretary for several years. He was Honorary Secretary of the London Conference in 1926 and was also responsible for the secretarial arrangements in connection with the London activities of the International Conference in 1929.

MR. F. J. TAYLOR, J.P., was President-elect of the Wales and Monmouth Branch, and at the time of his death in December, 1932, was actively engaged in making arrangements for the Cardiff Conference.

MR. CARLO VANZETTI, C.B.E., of Milan, died while on a business visit to Paris in May, 1932. He was President of the International Committee of Foundry Technical Associations in 1930 and in his capacity of Honorary Corresponding Member of the Institute for Italy did much to promote the interests of the Institute in that country.

MR. W. B. LAKE, J.P.

(Re-elected Honorary Treasurer of the Institute).

MR. WILLIAM SHAW died in May, 1933. He was President of the Middlesbrough Branch during the year 1930-31 and took an active part in the arrangements of the Middlesbrough Conference held in 1930. He and Mrs. Shaw entertained the whole of the delegates and ladies at their residence on that occasion.

TABLE II.—*Analysis of Membership, April 30, 1933.*

Branch.	Subscribing firms.		Members.		Associate members.		Associates.		Total.	
Birmingham	1	(1)	102	(101)	125	(124)	20	(19)	248	(245)
East Midlands	4	(4)	46	(50)	93	(94)	4	(3)	147	(151)
Lancashire	13	(12)	114	(108)	238	(239)	23	(17)	388	(376)
London	5	(5)	149	(152)	79	(88)	10	(10)	243	(255)
Middlesbrough		(1)	30	(28)	36	(41)	5	(6)	71	(76)
Newcastle	7	(9)	44	(41)	41	(44)	54	(66)	146	(160)
Scottish	6	(6)	83	(83)	171	(181)	8	(15)	268	(285)
Sheffield	7	(7)	82	(76)	72	(75)	8	(10)	169	(168)
Wales and Monmouth ..	2	(1)	27	(27)	36	(32)			65	(60)
West Riding of Yorkshire	3		36	(36)	60	(54)	2	(2)	101	(92)
Unattached	1	(1)	35	(39)	11	(10)	1	(1)	48	(51)
	49	(47)	748	(741)	962	(982)	135	(149)	1,894	(1,919)

The figures in brackets are for the year ending April 30, 1932.

The Newcastle-upon-Tyne Conference.

The Newcastle-upon-Tyne Branch were the hosts at the Twenty-ninth Annual Conference which was held in Newcastle-upon-Tyne from June 7 to June 10, 1932.

At the Annual General Meeting held on the opening day of the Conference, Mr. Victor Stobie, M.I.E.E., was installed President in succession to Mr. Andrew Harley. The Civic Authorities attended the official opening of the Conference and the Annual Banquet, and entertained the members and ladies to a Reception and Ball at the Old Assembly Rooms. The Council tenders its sincere thanks to the Lord Mayor, the Deputy-Lord Mayor, the Sheriff and to Sir William Marris, Principal of Armstrong College.

The Council also expresses its thanks to the firms who invited parties of members and ladies to visit their works; to the authors of Papers, to those who subscribed to the Conference Funds; and to all who assisted in the organisation. Thanks are especially due to the President of the Newcastle-upon-Tyne Branch, Mr. W. Scott, and to Mr. J. W. Eckford, Conference Honorary Secretary.

Technical Committee.

The Technical Committee has been particularly active in its efforts to place before the members the results of modern knowledge in such a way that members can apply these results to their own problems. Numerous meetings of the Committee, of the Technical Council, and of the Sub-Committees, have been held, and the Committee was responsible for the organisation of the Institute's Technical Exhibit at the recent International Foundry Trades' Exhibition. Over thirty applications for membership have been received as a result of the interest aroused by this Technical Exhibit. A detailed report of the work of the Technical Committee appears elsewhere in this Report.

International Foundry Trades' Exhibition.

The Institute thanks the Foundry Trades' Equipment and Supplies Association and Messrs. F. W. Bridges & Sons, Limited, for inviting the members of the Council to luncheon, and the members of the Institute to tea on the occasion of the Institute's official visit to the Exhibition on April 29, and also for their very valuable help in connection with the Institute's Technical Exhibit.

Other Exhibitions.

Members of the General Council accepted an invitation from the Birmingham Chamber of Commerce to lunch at the British Industries Fair on March 3. Messrs. F. W. Bridges & Sons, Limited, have invited the Council to the luncheon, and the whole of the members to tea, at the Shipping, Engineering and Machinery Exhibition to be held at Olympia, in September, and the Council have accepted these invitations.

Examinations in Foundry Practice.

Reference was made in previous Annual Reports to the "Craft" examination in Foundry Practice and Science, and in Patternmaking, arranged in conjunction with the City and Guilds of London Institute. The first examinations under the new syllabuses were held in May, 1932. There were fifty candidates in the subject of Foundry Practice and Science; twenty-seven of these had followed registered courses at ten different colleges, and twenty-three other candidates had prepared themselves for examination by private study or by attending non-registered courses. Thirty-one candidates passed the examination; ten in the first class and twenty-one in the second class. The Bronze Medal for the highest place in the country was gained by Mr. T. R. Walker, honorary secretary of the Sheffield Branch of the Institute, and a student of the Sheffield Foundry Trades Technical Society.

In the subject of Patternmaking, there were fifteen candidates in the Intermediate Grade, of whom three were awarded first-class certificates and four passed in the second class. There were eight candidates in the Final Grade, one of whom passed first class and two second class. The Silver Medal, awarded in the Final Grade

for the highest place, was gained by a student of the Rugby College of Technology and Arts, Mr. G. K. Simpson; and the Bronze Medal, for the highest place in the Intermediate Grade, was awarded to a student from the Sheffield Foundry Trades' Technical Society, Mr. J. G. Rees, who is an Associate Member of this Institute.

Reference has been made also in previous reports to the arrangements for the issue of certificates of a "technological" character as distinct from craft certificates. These arrangements consist of an endorsement in respect of special foundry subjects by the President of the Institute, of the National Certificates in Mechanical Engineering issued jointly by the Institution of Mechanical Engineers and the Board of Education. Twenty-five such certificates have been endorsed during the past year, making a total of thirty-seven since the scheme became operative.

The schemes which are now in existence cover the requirements of all grades of foundry personnel and their success depends upon the support which they receive from those for whom they are intended. Most education authorities will gladly organise the requisite courses if they are assured of a reasonable attendance of pupils. Members of the Institute can assist materially by facilitating the attendance at these courses of the junior members of their staffs.

Sheffield University.

The General Council views with considerable satisfaction the proposed inauguration of a Degree course in Founding at the University of Sheffield as outlined in a Paper recently presented to the Sheffield Branch by Prof. J. H. Andrew.

The General Council has decided to make an appeal to the members of the Institute to support this scheme financially and it is hoped to raise at least £100 before the date of the Cardiff Conference. Members of the Institute are invited to forward their subscriptions in support of this scheme to the General Secretary of the Institute.

Awards.

The Oliver Stubbs Medal.—The eleventh award was, in 1932, to Mr. J. E. Hurst, "for original work on the metallurgy of cast iron."

Diplomas.—At the Newcastle Conference the Council announced that Diplomas had been awarded to five members for Papers given during the previous session. The names of the recipients and the Branches before which the Papers were presented, are as follow:—T. R. Twigger, Birmingham Branch; W. West, Lancashire Branch; Dr. Guido Vanzetti, London and Lancashire Branches; W. Y. Buchanan, Scottish Branch, and Dr. H. W. Swift, West Riding of Yorkshire Branch.

The announcement of the Diploma awards for the session 1932-33 will be made at the annual general meeting on June 20.

Buchanan Medals.—One Buchanan medal was awarded to a member of the Lancashire Branch Junior Section, Mr. Jack Holmes.

In future and with the consent of the donor, the income derived from the Buchanan Medal Fund will be used to provide one Buchanan silver medal and a number of Buchanan prizes to be awarded on the results of the City and Guilds examinations in foundry practice and in patternmaking.

Surtees Memorial Examination.—These examinations are conducted in alternate years by the Scottish and Newcastle-upon-Tyne Branches. The 1933 examination was held by the Newcastle-upon-Tyne Branch, and a much higher standard was attained than in previous years.

The following were the successful candidates:—First prize, T. White, Gateshead; second prize, H. Vasey, Wallsend, and third prize, J. Mills, South Shields.

Overseas Foundry Associations.

Over 30 members and ladies attended the International Foundry Conference and Exhibition held in Paris in September. This Conference was of particular interest to British Foundrymen as Mr. A. Harley, the immediate Past-President of the Institute, was President of the International Committee, and in that capacity was the principal guest at many of the Conference functions. Mr. Harley presided over the meeting of the International Committee of Foundry Technical Associations held in Paris during the period of the Conference, and the Institute was represented at this meeting by Mr. J. Cameron and Mr. V. C. Faulkner, Past-Presidents. The general secretary was also present in his capacity of honorary secretary of the Committee. The Institute was represented also at the meeting of the International Cast Iron Testing Committee held in Paris in September.

The official Exchange Paper was presented to the Paris Conference on behalf of the Institute of British Foundrymen by Prof. Hanson, of the University of Birmingham. Other Exchange Papers which will be presented on behalf of the Institute to forthcoming Conferences are as follow:—American Foundrymen's Association: Chicago, June. Paper by Mr. Ben Hird; Polish Foundry Conference: Warsaw, June. Paper by Mr. W. Y. Buchanan, and International Foundry Conference: Prague, September. Paper by Mr. C. H. Kain.

Exchange Papers will be presented to our Conference at Cardiff, in June, on behalf of the American, French and German Associations.

Branch Activities.

The new sections of the East Midlands and Lancashire Branches formed respectively at Lincoln and Preston have continued actively with their work. The Scottish Branch has held several of its meetings in Edinburgh, and has an Edinburgh and District Committee to watch over the interests of members in that city and neighbourhood.

The attendances at the various Branch meetings and social functions have been well maintained and in many cases increased. The President has had an excellent opportunity of studying the Branches during the visits which he has paid during the course of the year, and he expresses great admiration for the work they and their officers are doing.

The number of meetings of Branches and Junior Sections was 115; additionally, several visits to works were arranged by each Branch. The thanks of the Council are tendered to all who have assisted in the activities of the Branches, including the officials, authors of Papers, and directorates and staffs of works which have been visited.

British Cast Iron Research Association.

The activities of the Association have been fully maintained during the year. Thirty-five balanced-blast cupolas are either in operation or under construction; a revised report has been issued on "Recommended Methods for Sampling and Analysis of Cast Ferrous Alloys"; a similar re-issue is in preparation on "Methods of Testing and Examination of Moulding and Core Sands," and work has been done on vitreous enamelling and on the basis of purchase of pig-iron. The Association also had a technical exhibit at the recent Foundry Trades Exhibition. During the year the newly-extended laboratories were opened by Lord Rutherford.

Close relations between the Institute and the Association have been maintained; the Director has just completed a successful year as President of the Birmingham, Coventry and West Midlands Branch of the Institute; the secretary of that Branch is a member of the staff of the Association, each eligible member of which is also a member of the Institute. Various members of the staff are members of the Institute's Technical Committee and its Sub-Committees, and a Paper by another member of the staff is being presented to the Institute's Annual Conference at Cardiff.

Although the membership and industrial income of the Association is increasing, its financial position causes some concern, on account of the cut in the Government grant. In order to maintain the grant at its present figure, it is necessary to obtain an immediate increase in income to an extent which necessitates the recruitment of some 40 or 50 new members. An appeal is made to all eligible firms to support the Association.

Bye-Laws and Rules.

The Sub-Committee appointed to revise the Bye-Laws and Branch Rules has almost completed its work. A draft of the recommended revised Bye-Laws and Rules has been submitted to the Branches, and their recommendations have been adopted whenever possible. The Annual General Meeting on June 20 will be asked to consider and approve the final revision.

General Council.

Four General Council Meetings and a large number of Committee Meetings have been held at Newcastle-upon-Tyne, Birmingham, Edinburgh and London. The average attendance at General Council Meetings was 42. A number of meetings of the Rules Revision Committee have also been held. The Technical Committee and the Technical Council have held eight meetings, and the Sub-Committees have held numerous meetings at various centres. Meetings have also been held by the Advisory Committee which operates in conjunction with the City and Guilds of London Institute and by its Sub-Committees.

Of the ten members of the General Council elected by the Annual General Meeting, five retire each year. The five who so retire at the Annual General Meeting on June 20 are Messrs. A. Firth, E. Longden, H. Pemberton, H. Winterton and D. H. Wood. All these gentlemen offer themselves for re-election. The thanks of the Council are tendered to Mr. W. B. Lake, J.P., whose services as Honorary Treasurer have been invaluable.

Cardiff Conference.

The Thirtieth Annual Conference will be held at Cardiff from June 20 to 23, when Mr. C. E. Williams, President-elect, will be installed President of the Institute.

VICTOR STOBIE, *President.*
TOM MAKEMSON, *General Secretary.*

BALANCE SHEET, DECEMBER 31, 1932.

LIABILITIES.

	£ s. d.	£ s. d.	£ s. d.
Subscriptions paid in advance			89 15 6
Sundry Creditors			438 4 1
The Oliver Stubbs Medal Fund:—			
Balance from last Account	200 17 11		
Interest to date	7 14 0		
Income Tax Refund ..	15 2 3		
	£ s. d. 223 14 2		
Less Cost of Medal .. 9 0 0			
Accountancy, &c., re Income Tax Repaid .. 5 5 0			
	14 5 0		
		209 9 2	
The Buchanan Medal Fund:—			
Balance from last Account	116 2 0		
Interest to date	4 15 9		
Income Tax Refund ..	1 6 3		
	122 4 0		
Less Cost of Medal, &c. .. 0 14 8			
Accountancy re Income Tax Refund .. 0 10 6			
	1 5 2		
		120 18 10	

	£ s. d.	£ s. d.
International Conference Fund :—		
Surplus included in General Investments		40 18 11
Accumulated Fund :—		
Balance at December 31, 1931	1,428 10 11	
Less : Excess of Expenditure over Income for the year ended December 31, 1932	0 6 3	
		1,428 4 8
		£2,327 11 2

ASSETS.

Cash in hands of Secretaries :—		
Lancashire	—	
Birmingham	20 16 8	
Scottish	22 16 11	
Sheffield	15 16 2	
London	34 15 1	
East Midlands	23 11 8	
West Riding of Yorkshire	16 9 4	
Wales and Monmouth ..	12 11 6	
Middlesbrough	9 4 9	
		156 2 1
Sundry Debtors :—		
Subscriptions due and subsequently received	62 9 6	
Due from Sheffield Council	3 17 6	
		66 7 0
Lloyds Bank Ltd.		489 18 1
The Oliver Stubbs Medal Fund :—		
£342 5s. 7d. Local Loans £3 per cent. Stock at cost	200 0 0	
Balance at Lloyds Bank Ltd.	9 9 2	
		209 9 2
The Buchanan Medal Fund :—		
£125—£3 10s. per cent. Conversion Stock at 78¼	98 6 9	
Balance at Midland Bank	22 12 1	
		120 18 10
Investments Account :—		
£450-5 per cent. War Loan at Cost	430 9 10	
£300-5 per cent. Conversion Stock 1944 64 at Cost	297 14 11	
£653 19s. Local Loans 3 per cent. Stock at Cost	451 13 8	
		1,179 18 5
Furniture, Fittings and Fixtures :—		
Per last Account ..	116 10 8	
Less : Depreciation 10 per cent.	11 13 1	
		104 17 7
		£2,327 11 2

We have prepared and audited the above Balance Sheet with the Books and Vouchers of the Institute, and certify the same to be in accordance therewith.

Chartered Accountants, J. & A. W. SULLY & Co., *Auditors.*

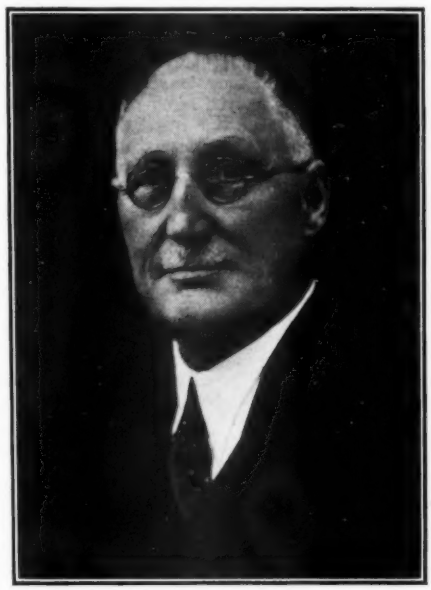
19–21, Queen Victoria Street, London, E.C.4.
April 24, 1933.

W. B. LAKE, *Hon. Treasurer.*
TOM MAKEMSON, *General Secretary.*

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED DECEMBER 31, 1932.

EXPENDITURE.

	£ s. d.	£ s. d.
Postages		116 9 9
Printing and Stationery, including printing of "Proceedings"		641 14 2
Council, Finance and Annual Meeting and Expenses ..		101 11 0
Medal for Past-President ..		2 6 6
Branch Expenses :—		
Lancashire	146 10 8	
Birmingham	76 5 1	
Scottish	88 2 7	
Sheffield	80 6 9	
London	68 13 11	
East Midlands	45 4 2	
Newcastle	48 11 2	
West Riding of Yorkshire	20 3 6	
Wales and Monmouth ..	24 13 8	
Middlesbrough	31 4 3	
		629 15 9
Audit Fee and Accountancy Charges (including Income Tax Claim)		32 0 6
Incidental Expenses ..		60 14 0
Salaries—Secretary and Clerks		696 0 4
Rent, Rates, &c., of Offices, *less* Received		122 5 8
John Surtees Memorial Examinations Grants to Branches		9 14 10
Subscription International Committee		5 0 0
Depreciation of Furniture ..		11 13 1
		£2,429 5 7



MR. J. J. MCCLELLAND
(The Honorary Convention Secretary).

INCOME.

	£ s. d.	£ s. d.
Subscriptions received :—		
Birmingham	300 6 0	
East Midlands	151 13 6	
Lancashire	400 3 0	
London	337 12 0	
Middlesbrough	93 9 0	
Newcastle	129 3 0	
Scottish	302 18 6	
Sheffield	248 6 6	
Wales and Monmouth ..	68 5 0	
West Riding of Yorkshire	98 14 0	
Unattached Members ..	27 6 10	
	2,157 17 4	
Add: Adjustment for Subscription paid in advance, and owing	138 7 10	
		2,296 5 2
Sale of "Proceedings," &c.		6 2 0
Interest on Investments and Cash on Deposit ..		58 5 3
Income Tax Refund ..		56 19 9
John Surtees Medal Fund, Surplus		7 3 4
Surplus on Sale of Badges ..		4 3 10
Excess of Expenditure over Income carried to Balance Sheet		0 6 3
		£2,429 5 7

Balance Sheet and Accounts.

MR. W. B. LAKE, J.P. (hon. treasurer), proposing the adoption of the accounts for the year ended December 31, 1932, and the balance sheet at that date, said that the figures had been very carefully considered by the Finance Committee and the General Council. Commenting on the fact that the income and expenditure account showed an excess of expenditure over income of 6s. 3d. for the year, Mr. Lake said that if there had not been adopted a rather different form of accountancy in 1932—a perfectly legitimate form—the excess of expenditure over income would have been greater. Every effort had been made by the Council to reduce expenditure at the head office; the main sources of expenditure, however, were the Branches, and he made an earnest appeal to all the Branch Councils to limit their expenditure to that which was absolutely necessary until times were better. He was anxious that the Institute's very small balance should not be further depleted.

MR. V. C. FAULKNER (Past-President) seconded the resolution.

MR. J. SMITH (Newcastle Branch) urged that the expenditure of the Branches was very reasonable indeed, and he expressed the view that the General Council should "sit up and take notice" of the expenditure of the Institute as a whole. He believed this was the first occasion in 30 years in which there had been a deficit.

MR. J. S. G. PRIMROSE said that that was not correct.

MR. SMITH drew attention to the expenditure on printing and stationery, including the printing of Proceedings, which amounted to £641 14s. 2d. in 1932, and he suggested that the General Council might be able to reduce this expenditure. He repeated that in his view the Branches were not at all extravagant.

MR. LAKE hastened to point out that he had made no accusation against the Branches, whose officers had always done their best; he was merely appealing to them to make a special effort to economise during the present critical times. With regard to the item for printing and stationery, he pointed out that it included not only the cost of printing the Proceedings but also the Branch letter-paper, and so on. The item in question had received particular attention, and it and all other items would continue to be subjected to the careful scrutiny of the Finance Committee.

MR. J. S. G. PRIMROSE, dealing with Mr. Smith's statement that there had not been a deficit previously, pointed out that on six occasions the expenditure had exceeded income. However, the total income of the Institute since its formation was £30,903, and it had spent £29,229, so that there was a balance in hand. Commenting upon the form of the accounts, he said that at long last the income from the individual Branches was shown, but unfortunately, owing to the adjustment, one could not see exactly what each Branch had received.

The motion for the adoption of the accounts was carried.

Report of the Technical Committee.

MR. J. W. GARDOM (Convener of the Technical Committee) presented and moved the adoption of the Committee's Second Annual General Report, together with the Reports of the Sub-Committees. In doing so he said the Committee was not trying to carry out original research or technical work. The existence of the Committee, however, made it easier to co-operate with other bodies; at times in the past it had been necessary to appoint a representative of the Institute on other bodies at short notice, and it was sometimes difficult to find someone able and willing to do this work in the time available. Now that the Technical Committee was in being, the Institute had an organisation whereby it could call upon at short notice any persons who could be relied upon to give information as occasion arose. Such an occasion had arisen in connection with the Institute's exhibit at the recent International Foundry Trades' Exhibition. The Committee was prepared to do its best to answer freely any correspondence or questions put to it.

MR. J. S. G. PRIMROSE (Deputy-Convener) said that the work the Committee was doing was progressing favourably and the members were co-operating heartily. Its object was service, and he hoped that banner would be carried forward.

The Committee's Report was adopted.

SECOND ANNUAL GENERAL REPORT OF THE TECHNICAL COMMITTEE.

When the Technical Committee's first report was presented a year ago, the meetings of the Committee were limited in number, and as each meeting was held usually on the same day as the meeting of the General Council and of several committees, the time available was inadequate to deal with the technical work of each sub-committee and the routine work of the full Committee. It was obvious that the programme of work outlined in the first report would necessitate some reorganisation, and this reorganisation was carried out after the consent of the General Council had been obtained. The organisation is now as follows:—

A Technical Council was created, which consists of: (*a*) Two members from each Branch elected at the Annual General Meeting of the Branch and (*b*) the Convener and Deputy Convener of the Technical Committee and Conveners of Sub-Committees if not already elected under (*a*).

The Technical Committee consists of: (*c*) The Technical Council, (*d*) co-opted members of the Sub-Committees and (*e*) the Convener of the Technical Council and Conveners of the Sub-Committee who have held office the previous year.

The Technical Council meets four times per year on the same day as the General Council and deals with administrative matters. The Technical Committee meets at least four times per year, on each occasion a few weeks before the date of the meeting of the Technical Council, and the whole of the time is given up to technical matters firstly in Sub-Committee meetings and finally at the full meeting of the Committee at which all the members consider and discuss the reports of each Sub-Committee. This ensures that each Sub-Committee is familiar with the work of the others. The full Technical Committee has met six times during the past year at Newcastle-upon-Tyne, Crewe, York, London (twice) and Birmingham. For the convenience of arranging Branch programmes, the dates appointed for meetings of the Technical Committee during 1933-34 are given at the end of this report.

The Sub-Committees have been divided into the following two groups:—*Group* (*a*) *General Subjects*—Sub-Committees on Sands, Melting Furnaces and Costing, and *Group* (*b*) *Specialised Subjects*—Sub-Committees on Cast Iron, Non-ferrous Castings, Steel Castings, Malleable Cast Iron.

No person can be a member of more than one Sub-Committee in the same group so that it is possible for all the Sub-Committees in each group to meet at the same time. Rules regulating correspondence and administrative details have been formulated during the past year. It will be seen that two of the foregoing Sub-Committees, namely, those on Melting Furnaces and Costing, have been formed during the past year.

Inquiry Bureau.—An inquiry bureau has been started so that any member of the Institute who desires technical information can forward his inquiries to the Technical Committee, the appropriate members of which will endeavour to deal with them. Seven such inquiries have been received.

Technical Exhibit at the Foundry Trades' Exhibition.

By courtesy of the organisers, the Institute was enabled to arrange a technical exhibit at the recent International Foundry Trades' Exhibition which was held from April 24 to May 3. The whole of the work in connection with the exhibit was carried out by the Technical Committee and its Sub-Committees, each of which made itself responsible for the arrangement of a section of the exhibit illustrative of recent progress and development in the department in which it is particularly interested. Additionally, posters and charts giving statistics relating to the Institute's growth, personnel and activities were exhibited, and examples of the Institute's publications were on view.

As a result of this comprehensive exhibit, the foundry trade was able to form some estimate of the amount of valuable work which the Institute is carrying out through its Technical Committee in the development of modern foundry technique. The interests of many non-members was aroused and as a direct result 32 applications for membership were received, consisting of three subscribing firms, 22 members, seven Associate members.

The exhibit involved an immense amount of detailed and painstaking work on the part of the members of the Technical Committee and of the Sub-Committee conveners, and all these members responded nobly to the demands made upon them. Acknowledgment is also made of the valuable help received from many firms and individual members of the Institute who loaned samples for exhibition and particularly of the valuable contribution of the British Non-Ferrous Metals Research Association. A brief synopsis of the exhibits in each section is as follows:—

Melting Furnaces Section included models of various types of furnaces, samples of furnace refractories and charts and samples illustrating tests on fuels.

Sands Section consisted of sand-testing apparatus of various types, both standard and modified, samples of sand mixtures after repeated use and a series of sands with records of tests. Microscopes were available for examination of samples.

Cast-Iron Section included samples of special and recently developed cast irons, sets of test-bars showing various international standards, examples of B.S.I. test-bars, samples showing recent work on the effects of phosphorus and the effects of pouring temperature on shrinkage.

The Malleable Cast Iron Sub-Committee showed test-bars, zoning chart and other material referred to in their report presented to the 1932 Conference and also examples of gating, etc., of typical malleable castings.

The Steel Castings exhibit included many interesting and unusual steel castings and castings in heat-resisting and other alloy steels.

The Non-Ferrous Section included series of examples illustrating causes and elimination of pin-holes in aluminium castings, gases in copper, testing of castings, examples of various alloys and representative castings.

The General Exhibits included charts explanatory of the recently-issued B.S.I. specification for marking and colouring patterns, and sets of patterns coloured according to the specification. A series of models indicating the economical methods of moulding were also displayed.

A large number of microsections of cast metal were available and a number of microscopes for their examination were provided.

The Reports of the Sub-Committee show that a considerable amount of progress has been made in their special subjects in addition to the work referred to in this General Report.

J. W. Gardom, *Convener,*
Technical Committee.

REPORTS OF SUB-COMMITTEES.

Sub-Committee on Cast Iron.

This Sub-Committee is preparing a series of photomicrographs showing various qualities of ordinary cast iron, both etched and unetched, for use by members as a comparative standard. The B.C.I.R.A. is co-operating in this work.

The Committee has also had under discussion the influence of phosphorus on cast iron, with particular reference to strength and soundness, and experimental work is being carried out in this connection. This subject was originally undertaken to investigate whether or not a "dangerous range" exists with phosphorus about 0.5 to 0.6 per cent. above and below which improved results are obtained. Any members having experience bearing on this problem are invited to write to the convener. Allied to this subject, the form of a suitable porosity test has been under discussion. Work has also been carried out on the effect of pouring temperature and composition on shrinkage and contraction.

In conjunction with the Malleable and Steel Sub-Committees the desirability of standardising pig-irons was discussed, and it was decided that this would not be advisable, as the present wide range of compositions available is an advantage in view of the wide variety of castings produced.

It has been decided that it is not practicable to attempt to introduce a standard wear test at the present time.

Little work has been done on Specifications, though a few authorities have been persuaded to adopt the B.S.I. specification as an alternative to their own. The Sub-Committee strongly recommends that in figures referring to transverse tests, transverse rupture stress (modulus of rupture) should be given. It is hoped that in the near future the Sub-Committee will be able to draft a specification for irons of better quality than those included in the present B.S.I. specification.

During the latter part of the session a considerable part of the activities of the Committee have been devoted to collecting specimens for the Technical Exhibit.

It is hoped that the Committee will be in a position to give a technical report on these subjects at the next Annual Conference.

P. A. Russell, *Convener.*

Sub-Committee on Non-Ferrous Castings.

Since our first report was issued a year ago, this Sub-Committee has held five meetings, and its members have attended six full Technical Committee meetings. With the object of simplifying specifications, a series of three gun-metal and three leaded phosphor-bronze alloys have been agreed upon, and this is being submitted, with the sanction of the Council, for consideration and adoption by the British Standards Institution to supplement their existing two standards, Nos. 383 and 421. Agreement has also been reached as to the shape and best method of casting gun-metal test-bars in two sizes, for the purpose of achieving the most uniform results; examples of these castings and machined bars were shown on our section of the Technical Committee's exhibit for the Institute at the Foundry Trades Exhibition in London. Typical enlarged photomicrographs were also displayed, but as these were not agreed standards, it has been decided to make a collection of standard photomicrographs to correlate with the physical properties of the several recommended alloys. Further standard data of physical properties of alloys have been collected to augment the lists of non-ferrous metals and alloys giving their electrical conductivity, thermal conductivity, and also specific heat. New adopted lists have been in preparation to give the latest known values for coefficients of thermal expansion with varying temperature, and also working contraction allowances of important alloys.

When the results of the various items of work have been finally agreed upon, it is proposed to communicate the whole findings of the Sub-Committee to the Institute in the form of a published Paper. Whilst continuing with the several items of work in hand, new spheres of activity are being sought, and, where necessary, the co-operation of the British Non-Ferrous Metals Research Association will be invoked, as was the case in the preparation of the technical exhibit, with much appreciated results.

J. S. G. Primrose, *Convener.*

Sub-Committee on Malleable Cast Iron.

During the previous year the Sub-Committee had undertaken for its major work an attempted correlation of the physical properties of malleable cast iron with microstructure. In carrying out the work it was found that there were so many variables which had been unforeseen

that it was resolved to repeat the investigations and to take steps to eliminate many of the features which were undesirable. The investigation as now planned is of such dimensions that the Committee regret they are unable to publish any results at present, and it will be many months yet before the work is brought to completion. A standard pattern for the production of test-bars has been made; and this has been put into work by the members of the Committee, and as a result it has been possible to equip the pattern with runners and feeders which will ensure the casting of perfectly sound bars under the varying conditions obtaining in the many foundries co-operating.

The Committee has also undertaken to study the possibility of introducing a standard sized bar with varying requirements, to overcome the objection to the existing specifications which call for one requirement only, irrespective of the section of the castings. In connection with this, a number of patterns have been made of different diameter test-bars, the sizes being those recommended by B.C.I.R.A., and published in the Milan Exchange Paper by Dr. Norbury.

Some experiments were carried out on the after-heat-treatment of malleable, and microsections from some of the bars treated were exhibited at the International Foundry Trades Exhibition. The results of the experiments show that there is a fruitful field here for investigation, and the Committee propose to consider such an investigation.

Recommendations have been made to the appropriate authority respecting an unsatisfactory specification for malleable, and as a result, consideration when redrafting has been promised. The Sub-Committee has supplied information through the Technical Committee upon the subject of special methods for examining the physical characteristics of malleable cast iron from molten metal to the finished casting.

A. E. PEACE, *Convener.*

Sub-Committee on Melting Furnaces.

This Sub-Committee has been considering the present position regarding foundry melting furnaces with a view to drawing up a report for issue to members of the Institute. Information has been obtained from the furnace designers regarding the type and number of furnaces which have been installed since 1920, and a classification of the various furnaces and their applications has been drawn up.

The Sub-Committee is now engaged upon the preparation of a report on two types of foundry melting furnaces, namely, the cupola and the crucible furnace. This report will deal with the design and typical operation of the furnaces in question, and will outline the characteristic features of the various furnaces of the same general type. At the same time, data on other types of furnaces have been, and will be, collected with a view to issuing reports on such furnaces in due course.

F. K. NEATH, *Convener.*

Sub-Committee on Sands and Refractories.

The work of the Sands and Refractories Sub-Committee is dealt with in the Paper presented at the Annual Conference this year, and reference should be made to it for full details.

In brief, methods for the rapid determination of moisture in foundry sands have received consideration, and a thorough investigation has been made into the methods and apparatus which have been put forward for the determination of permeability and bond strength of green sands. In addition, a series of tests has been made with a view to correlating as far as possible results obtained by using different types of apparatus, chiefly those advocated by the A.F.A. and B.C.I.R.A.

In order to afford an opportunity for anyone outside the Committee to contribute any helpful information, the Sub-Committee has withheld putting forward any definite recommendations until after the Conference Paper has been given.

N. D. RIDSDALE, *Convener.*

Sub-Committee on Steel Castings.

This Sub-Committee has followed up work already accomplished in the collection and tabulation of specifications. It is hoped to recommend an addition to existing specifications with a view to effecting a generally higher standard of efficiency throughout the trade. Members of the Sub-Committee have been approached with a view to compiling figures for this higher specification, and the matter is still in hand.

F. J. HEMMING, *Convener.*

MR. J. E. HURST
(Junior Vice-President of the Institute of British Foundrymen).

MR. J. E. HURST is the Technical Director of Messrs. Sheepbridge Stokes Centrifugal Castings Company, Limited, and also Technical Director of Messrs. Bradley & Foster, Limited, Darlaston. He has been intimately associated with the development of the centrifugal casting process in Great Britain, particularly in its application to special cast irons for high-duty purposes, and was manager of the centrifugal casting department of Messrs. Newton Chambers & Company, Limited, which has now been merged into the organisation with which he is at present connected. Formerly he was assistant chemist to Messrs. Beyer, Peacock & Company, Limited, Locomotive Works, Gorton, Manchester. He became successively chief chemist and metallurgist to Messrs. Richard Hornsby & Sons, Limited, of Grantham and Stockport, makers of gas and oil engines, and chief chemist and metallurgist to Messrs. D. Napier & Sons, Limited, Acton, London, during the war engaged in the manufacture of aeroplanes and aeroplane engines. Subsequently he identified himself with the centrifugal casting process with Stokes Castings, Limited, Mansfield, and Centrifugal Castings, Limited, Kilmarnock. In 1918 and 1919 he was Editor of THE FOUNDRY TRADE JOURNAL. He has been actively engaged and interested in research work in connection with cast iron, and is the author of the well-known text-books "Metallurgy of Cast Iron" (Sir Isaac Pitman & Sons, Limited, London) and "Melting Iron in the Cupola" (Penton Publishing Company). He has made numerous and original contributions to the Iron and Steel Institute, of which he is a member and a Carnegie Research Scholar, and also to various other societies and technical bodies. He is an active member of the Institute of British Foundrymen, being President of the Sheffield Branch, and has lectured and presented Papers to practically every branch of the Institute. Last year he was awarded the Oliver Stubbs Gold Medal in recognition of his outstanding contributions to the metallurgy of cast iron, particularly in the form of new alloys. On the subject of centrifugal castings Mr. Hurst presented the Belgian Exchange Paper in 1924 and presented a Paper to the American Foundrymen's Association in 1926. For some years Mr. Hurst has conducted extensive research into the possibilities of hardening and tempering various cast irons and alloy cast irons. Results of some of his investigations have been presented to the Institute of British Foundrymen in a series of Papers commencing in 1930. Mr. Hurst is also a member of the Council of the British Cast Iron Research Association and a member of the Staffordshire Iron and Steel Institute.

By-Laws and Rules.

The retiring PRESIDENT then proposed the adoption of the revised By-Laws and Branch Rules, submitted by the Sub-Committee appointed for the purpose, in final form. The Council had made an alteration to the proposed revised Rules by deleting the requirement that Presidents of Branches should be full members of the Institute.

(The resolution was worded to give the Council authority to change the wording of the By-Laws and Rules where necessary to avoid clashing.)

MR. A. HARLEY (Past-President), seconding the resolution for the adoption of the revised By-Laws and Rules, also commented upon the removal of the requirement that a Branch-President should be a full member. He said it was the very general desire of the Council, as far as possible, that Branch officials should be full members, but the Council did not wish to make it a Rule that they must be always.

Mr. Harley also paid a tribute to the draughtsmen of the revised By-Laws and Rules for the wisdom they had manifested in compiling them. Generally speaking, no really drastic fundamental alterations had been made. He welcomed the Rule that members of Council should be elected for a period of three years; that was the outcome of the alteration which provided that 12 members should be elected (instead of 10), and that 4 should retire annually. It was felt that two years' service by an elected member of Council was much too short a period. That revision was a very definite improvement.

The resolution for the adoption of the revised By-Laws and Rules was carried unanimously.

Awards of Diplomas.

The SECRETARY (Mr. Tom Makemson) reported that the General Council had awarded Diplomas to the following:—

Mr. W. West for a Paper on "Phosphorus in Cast Iron," read before the Birmingham and Lancashire Branches.

Mr. E. Beardshaw for a Paper on "Some Further Notes on Oil-Engine Foundry Practice," before the Lancashire Branch.

Mr. E. J. L. Howard for a Paper on "Soundness in Bronze Castings," before the Lancashire Branch.

Mr. R. Ballantine for a Paper on "Plaster Patterns in General Foundry Practice," before the Scottish Branch.

Mr. C. A. Howe for a Paper on "Foundry Problems," before the Wales, Monmouthshire and West of England Branch.

Election of Officers for 1933-34.

The RETIRING PRESIDENT, proposing the election of Mr. C. Edward Williams, of Cardiff, to the Presidency of the Institute for the year 1933-34, said that after the eulogistic remarks made concerning Mr. Williams that morning by three Cardiff gentlemen, it was unnecessary to say much more in his praise. One felt bound to comment, however, upon the enthusiasm which Mr. Williams had displayed in his work on behalf of the Institute, which enthusiasm it had been a delight to witness; his heart was in the work, and one could say with confidence that he would make one of the finest Presidents that had ever led the Institute. The members were glad to attend a Conference in a district where their President was so highly esteemed, and they derived full satisfaction in this respect when they visited Cardiff.

MR. F. J. COOK, in his capacity as the oldest Past-President at the meeting, seconded the resolution and assured the members that they could not have made a better choice.

MR. WESLEY LAMBERT (Past-President), supporting, said his acquaintance with Mr. Williams had not extended over many years, but it had developed into a very warm friendship. Mr. Lambert also called particular attention to one or two of the statements published in the biographical notes concerning Mr. Williams, in the

Institute's Souvenir Booklet. In the first place he was associated with the foundry. Again, it was stated that his kindly charm and keen interest in the welfare of those working for his firm were reflected in the personal touch and in the high regard in which he was held. Further, it was recorded that he had always taken a keen interest in educational affairs and especially in the training of apprentices, and the members of the Institute were glad to think that he would carry on the good work which had already been done in that sphere. With the recommendation of the Wales, Monmouthshire and West of England Branch, together with the eulogistic words which had been uttered by Cardiff's principal citizens concerning Mr. Williams, the members of the Institute could be quite certain that they were doing the right thing in electing him President.

MR. A. HARLEY (Past-President) also took the opportunity to pay his personal tribute to Mr. Williams, and added that the Institute was honouring itself by electing him President.

Amid enthusiasm, Mr. Williams was unanimously elected and formally inducted into the chair, and invested with the chain of office.

In thanking the members for the honour they had conferred upon him, MR. WILLIAMS said that when he had bowed his head in order to be invested with the chain of office it was a sign that he had become the slave and the servant of the Institute. He adopted the motto of the Prince of Wales, "Ich Dien," meaning "I serve," and he undertook to serve the Institute to the best of his ability during the next twelve months.

Vote of Thanks to Retiring President.

The PRESIDENT proposed a hearty vote of thanks to Mr. Stobie for his services to the Institute during the past year as President and presented to him his Past-President's badge. Mr. Stobie was to be congratulated upon a very useful year's work, and the members wished him every success in the special activity he had undertaken, together with Prof. Andrew, in the establishment of a Chair of Foundry Practice at Sheffield University. During the past year he had carried out his duties on behalf of the Institute in a quiet and capable way deserving of the warmest thanks.

The vote of thanks was carried with acclamation.

MR. STOBIE, responding, thanked the members generally for the support they had afforded him during his year as President. During the year he had visited every Branch except one—his inability to attend on that occasion was due to illness—and he had enjoyed the very greatest help and friendship from all. The office was not a sinecure, but the work was lost in the mighty ocean of pleasure that came with it.

Vice-Presidents.

The PRESIDENT proposed that Mr. Roy Stubbs (Manchester), who had served as Junior Vice-President for a year, be promoted to the office of Senior Vice-President. The name of "Stubbs," said the President, was full of fragrant memories to all connected with foundry work in England, and he personally was much encouraged by the knowledge that he would be backed by the moral and "physical" support—(laughter)—of Mr. Stubbs. It was perhaps significant of the broad views held by the Institute that in the last three years it had had a Scotsman, an Englishman and a Welshman as President, and in Mr. Stubbs they had a man who, though perhaps not an Irishman, possessed the delightful charm of the Irish.

MR. A. PHILLIPS (President, Lancashire Branch), seconding, said that all the Branch members recognised Mr. Roy Stubbs as a very progressive foundryman and one who would carry out his duties as the Institute's Vice-President with the alacrity and enthusiasm he had displayed when President of the Lancashire Branch.

The resolution was carried unanimously, and in a brief response Mr. Stubbs said he looked upon this honour not so much as a personal one but rather as an honour to the Lancashire Branch.

MR. B. W. LAKE, J.P. (Hon. Treasurer), proposed the election of Mr. J. E. Hurst, of Sheffield, as Junior Vice-President. He called attention to the fact that Mr. Hurst had made a great name for himself not only in this country but throughout the world by reason of his researches into cast iron in various forms, and said that by electing him the members would be honouring the Institute.

MR. V. C. FAULKNER (Past-President), who seconded, said that of all the information that passed through his hands, as an Editor, there was nothing that was more appreciated by the metallurgical world than that which emanated from the pen of Mr. Hurst.

The resolution was carried with acclamation.

MR. HURST (who received last year the Oliver Stubbs Gold Medal) said he hoped that the election was not only meant to be an honour to him personally but was also the outcome of a desire that the Sheffield Branch should be represented in due course in the Presidential Chair.

Auditors.

On the motion of MR. GOULD, seconded by MR. W. E. CLEMENT, Messrs. J. & A. W. Sully & Company (chartered accountants) were re-elected auditors for the ensuing year.

Members of General Council.

It was announced that the following had been elected to the General Council: Prof. J. H. Andrew (Sheffield), Mr. V. Delport (London), Mr. E. Longden (Lancashire), Mr. H. Winterton (Scotland) and Mr. D. H. Wood (Birmingham).

A Vote of Thanks to Branch Hon. Secretaries.

MR. HERBERT FIELD proposed that the general meeting should express thanks particularly to the Hon. Secretaries of the Branches, who by their constant devotion to duty rendered the work of the Institute possible. He also included in this expression of thanks the general staff of the Institute.

The vote of thanks was seconded by the PRESIDENT, supported by MR. F. W. FINCH (who, as the Institute's first Hon. Secretary, had first-hand knowledge of the work of these officers), and carried, amid applause.

MR. J. J. MCCLELLAND (Hon. Secretary of the Wales, Monmouthshire and West of England Branch, and Hon. Secretary of the Conference) responded, and recalled that the Branch was originated in the room in which the Conference was now meeting; the late Mr. J. Ellis (Past-President of the Institute), the late Mr. Hollingworth (who was General Secretary) and himself had joined together to form the Branch. It was pleasing to know, he added, that the work of the Branch secretaries was appreciated, for their duties were onerous.

MR. H. BUNTING (who has been Hon. Secretary of the East Midlands Branch for twenty years) also responded to the vote of thanks. He remarked, amid laughter, that when such votes of thanks were carried unanimously and with acclamation he sometimes wondered whether the members were resolving to support their secretaries, by replying to correspondence, for instance, and by paying subscriptions, for the work of the hon. secretaries would be very much lightened if the members generally would do their part with an enthusiasm equal to that with which the vote of thanks had been carried. However, he had nothing to regret in regard to the work he had undertaken, and he had made many friends. Hon. secretaries generally would agree that their work was a pleasure, and, on their behalf, he expressed appreciation of the vote of thanks.

PRESIDENTIAL ADDRESS.

Mr. Williams then read his Presidential Address, in the course of which he said: Mr. Stobie and gentlemen, allow me to thank you once again for the honour you have done me in making me your President. As President I welcome the Conference very heartily to this our great city of Cardiff. This is not the first occasion on which the Institute has visited this city, for in August, 1912, the Conference was also held in this city. My co-director, Mr. Harry Griffiths, then acted as Secretary, and we are specially glad to see him with us to-day, and we congratulate him on his 27 years of unbroken membership.

The President in 1912 was my old friend, Mr. Charles Jones. All who knew him will regret that he has passed beyond our ken. I have re-read what he said in his presidential address. I was interested to find the essence of his address was a plea for *education in foundry work and in allied subjects*. Great strides have been taken in the direction for which he so eloquently pleaded, and it is more than a coincidence that, since our last Conference, this Institute, jointly with the City and Guilds of London Institute, carried out for the first time national examinations: in foundry practice and pattern making.

When I say it is more than a coincidence, I have in mind a saying of the Fabian Society, that it takes nineteen years for any valuable idea to come to fruition. In this case the saying is exactly fulfilled, and I claim that the seed of these examinations was sown here in Cardiff in 1912. I appeal to every member of this Institute to do what he can to nurture this young plant and to make these national examinations continuously successful.

As a result of educational efforts, more advance has been made in the knowledge of the structure of cast metals and alloys in the 21 years since the Institute last visited Cardiff than the sum total of such knowledge available in 1912. For these rapid steps we have to give thanks, not only to our chemists and microscopists, but to that team spirit which the Institute of British Foundrymen exhibits and fosters in a very especial degree. In this team we count the British Cast Iron Research Association, a body with whom this Institute runs in double harness; we also acknowledge the indebtedness of the foundry industry to the universities and technical colleges; the makers of the modern metallurgical microscopes and of X-ray apparatus; the Foundry Trades and Equipment Association who with Messrs. Bridges staged the recent Foundry Exhibition at the Agricultural Hall, Islington, and THE FOUNDRY TRADE JOURNAL and "The Foundry," so ably sponsored by Mr. Faulkner and Mr. Delport. Again, this Institute is a medium through which the team spirit is linked with other nations. These Annual Conferences themselves play a definite and valuable part in the work of the team, by keeping alive a spirit of good fellowship and mutual helpfulness, and by creating an atmosphere in which progress can thrive.

Another Annual Conference has come round, and I am going to ask the Conference a question: Of what importance has the founder been in the history of civilisation, and what is his place in the history which mankind is writing in the sands of time to-day? You will agree with me if I say the foundry is the foundation on which the super-structure of modern engineering has been raised.

But that is far too modest a claim. I would go much further and say: *The foundry is the foundation on which all civilisation and all social life, as we know it to-day, has been raised.* It is highly probable that the first metal cast by the founder was gold, then silver and copper. But the great step forward from the stone age to the bronze age was only possible when the foundryman united copper to tin. That was a great metallurgical marriage day! Without that foundryman might we not be still in the

stone age so vividly pictured for us by Mr. Heath Robinson?

If we ask ourselves what was the date of the first bronze casting, the answer is that our archæologists tell us they have discovered bronzes 6,000 years old, and the deeper the archæologist digs the more venerable becomes the art of the founder. This 6,000 years is a very hazy and indefinite date, and may be found to be much greater.

Historic Castings.

But I can speak of a definite foundryman of a very definite if remote date. In so doing I may be able, perhaps very briefly, to picture for you the advanced stage of bronze foundry practice just halfway back to that earliest date, that is 3,000 years ago. In the year 1066 B.C. there was living in the Liverpool of that day, in the remarkable city of Tyre, at the eastern end of the Mediterranean, a Syrian foundryman who married a Jewess. Their son very naturally followed his father's trade. This son, Hiram of Tyre, came down about 100 miles to the south of his home town, and there cast some notable bronzes which have become historic.

Amongst these were the two pillars which stood before the Temple of Solomon, and the bronze sea or basin which was laid on the backs of twelve bronze oxen within the Temple. There is little doubt that this bronze sea or basin was at least 15 ft. in diameter; a *true hemisphere*, and a handbreadth thick. *This gives a weight of about 25 tons.*

I must not go into any details of the decorations of pomegranites and the engraving, or of the gathering together of the metals from Cyprus and Britain, nor of the scene at the casting. But I will venture to draw your attention to the curious fact that these great pillars, and the bronze sea, were cast at Succoth, in the Valley of the Jordan, because of the suitable clay for crucibles and firebricks which was found at that spot.

The River Jordan at Succoth is 1,000 ft. below sea level! On the other hand, Solomon's Temple in Jerusalem was 2,500 ft. above sea level! So this foundryman, Hiram, cast a hemispherical bronze casting 15 ft. in diameter and 25 tons in weight, and transported it 30 miles to the top of a hill 3,500 ft. (the height of Snowdon) above his foundry. Such was the state of bronze foundry knowledge and practice 3,000 years ago. These bronzes remained intact for 400 years, and were then broken in pieces by the victorious Chaldean army and the broken metal carried away to Babylon.

Before going on from bronze to iron castings, let me remind you of the use of bronze in art. I need not stress the importance of art in the history of human civilisation. Bronze is a metal in which some of the most glorious visions of the artist have become imperishable for all time.

Greek artists of the 4th century B.C. produced bronzes which still remain to delight us. Nor have our modern artists ceased to delight us through their use of bronze. Only a few steps away many beautiful modern bronzes can be seen in our National Museum of Wales. The building itself with its great bronze doors is a work of art. From the group of bronzes in the entrance hall let me select for your special notice the bronze of "A Boy and a Butterfly," one of the many gifts of the artist, Sir Goscombe John, R.A., to his native city and country.

This same artist produced the equestrian bronze, which stands outside the Museum and represents the late Lord Tredegar, mounted on the charger which carried him as one of "the noble six hundred" in the historic "Charge of the Light Brigade." I take it for granted no visitor to Cardiff omits to visit the National Museum of Wales; there the foundryman may see in the archæological gallery a bronze dagger, excavated by Dr. Cyril Fox, the director of the Museum, from a tomb in Pembrokeshire. Experts say this dagger was already 700 years old when Hiram was at work, in Succoth, on the great bronzes I have just described.

Bell Founding.

Let us recall also the æsthetic uplift in the beauty of sound from the belfries of our churches and from carillons, for which we have to thank the skill of our bell founders. I would remind you of those little golden bells cast 3,500 years ago and worn by Aaron on his priestly robe in the wilds of the peninsular of Sinai, and of the Great Bell of Moscow, weighing 200 tons, which will be exactly 200 years old next year. But I must turn away from bronze and return to my main argument, and try to prove that the foundry is the foundation on which modern social life has been raised.

Discovery of Cast Iron.

The great step in civilisation and human progress, the discovery of bronze some 6,000

MR. J. W. GARDOM
(Oliver Stubbs Medallist).

MR. GARDOM received his early training while on the staff of the Metallurgical Department of Manchester University, the chair of which was held by Prof. Sir Henry Carpenter. After a long period on active war service, Mr. Gardom was appointed metallurgical chemist to Skefko Ball Bearing Company, of Luton, and later became identified with Messrs. Bagshawe & Company, of Dunstable, in which organisation he now holds a prominent executive position. Mr. Gardom joined the Institute of British Foundrymen in 1922. His organising ability was quickly appreciated, and by 1929 he was elected President of the London Branch. His services became recognised nationally when, as convenor of the Malleable Sub-Committee, a report of findings was presented last year to the Newcastle Conference and met with universal approbation. At this time the Institute placed the destiny of its Technical Committee in his hands, and its endeavours have been now recognised as an extremely important phase of its activities. It was able, for example, to stage a technical exhibit at the recent Foundry Exhibition which was acknowledged to be an unqualified success and defined in the clearest possible manner to the engineering profession the technical progress realised within the foundry industry.

years ago, was followed by a *second step: the discovery of cast iron.* Although the use of wrought iron goes back possibly to the Assyrians 2,000 B.C. and the discovery of blister steel and Damaxened swords to 1,000 B.C., it seems to be the curious fact that cast iron was only discovered a little more than 500 years ago. One wonders if this is really so. It was only about the 14th century when cast iron first appeared in Europe, and this was probably its first useful appearance in the world.

Possibly, even probably, the discovery of the use of cast iron was due to the stress and necessities of battle and war. With the first use of gunpowder at the battle of Crecy A.D. 1346 there came a search for some metal stronger than bronze for cannon. Similarly in the great war, 1914-18, there came a search for lighter metals for aeroplanes.

At all events we find that cast-iron cannon followed quickly after the use of gunpowder at Crecy. Referring to gunpowder in his "Short History of the English People," Green says: "The invention of gunpowder sounded the death knell of knights in shining armour and their feudal system."

So the foundryman can claim his share in progress from or out of the feudal system, for he made the cannon to enable gunpowder to do its job. A cannon with the end knocked off is a pipe. So it should not surprise us to find that a few years after the battle of Crecy the Frenchmen of Marseilles were laying cast iron water mains in their city. The older wooden water mains, however, held their own for some hundreds of years, and it is still no uncommon thing to see these old elm pipes being removed from under the streets of London.

At the present time cast iron is used for a thousand and one useful purposes of peace. One curious use I came across, only last summer, when I was looking at the cast-iron bollards for holding ship's ropes in Clovelly, and was assured that these were old cannon from a ship of the Spanish Armada wrecked on the North Devon Coast 350 years ago. A case of "*spears being beaten into pruning hooks.*"

It has been said that the tonnage of iron used in the world is a measure of world progress. If this be true, it is a remarkable answer to my original question as to the importance of the foundryman in civilisation. By this gauge high water mark was reached in the year 1929 when the total tonnage of cast iron and steel poured from the world's furnaces reached 120 million tons. But last year, 1932, this output had fallen to 48 million tons, which, according to Sir Robert Hadfield, is "much less than the annual loss through wastage."

These words "annual loss through wastage" set our minds picturing ships sunk at sea, metal lost in slag, corrosion by air and water, and our efforts to defy loss by means of oil, paint, zinc spray, enamelling, alloys of copper, chromium, and so on. Commenting on this great drop in output, in "The Times" of January, 1933, Sir Robert says: "Is it any wonder, therefore, that the world is so upset since its modern progress, nay civilisation itself, largely depends upon the use of the metal iron, chiefly in the form we term steel?"

Let me now sum up my claim, thus far, for the importance of the foundryman in the history of past and present civilisation, by thanking him for: Opening the door leading *out* of the stone age into the bronze age, and for progressing through the door of the *cast iron age* to those great gates leading into the steel age; for our Bessemer and Siemens furnacemen are only specialised foundrymen. So much I briefly say as to the foundryman's importance in *past* and *present*, then what of the *future*?

I claim that the foundryman is now pushing wide open the door of a new age. Over this door is written *the aluminium age.* Without aluminium it is difficult to imagine an efficient flying machine. During the Great War the outstanding feature of world progress was in the art of flying, and in the use of heavier-than-air machines. Without the foundryman modern flying would be impossible. I will venture to compare the weights of three modern engines to emphasise this point. The reciprocating engine of a modern tramp steamer weighs about 100 lbs. per horse-power; a very modern turbine marine engine weighs about 22 lbs. per horse-power; but the aeroplane engine to-day can be made weighing under 1 lb. per horse-power. Think of a 100 h.p. engine weighing less than 1 cwt., or again a 1,000 h.p. engine weighing under 9 cwt.

It is the discovery not only of aluminium as a foundry metal, but more particularly of the

alloys of aluminium that has effected this remarkable reduction of weight per horse-power, and consequently the remarkable achievements of the flying machine of to-day.

Sir John Siddeley in a recent address referred to the new discovery of "hiduminium" as a factor of great importance in the making of modern cars and aeroplanes. This is a typical example of an alloy produced commercially with laboratory precision.

The discovery and use of these alloys is the outcome of modern scientific methods in the foundry. Nothing is left to chance, as *mind controls matter*! And does not the scientist to-day define matter as mind seen through our human glasses?

The microscope of the foundry metallurgist; the use of X-rays; the investigation of crystal structure; pyrometric control of temperatures in electrical furnaces and muffles, and hydraulic compression are all aids to modern foundry practice in the hands of a highly trained staff of keen scientific foundrymen. They make modern flying speeds and non-stop distances possible.

We pay tribute to the marvellous designs of the draughtsman, and the almost superhuman accuracy of the moulders, machinists and mechanics who all unite with the foundryman in carrying the work to its ultimate perfection. Lastly we admire the pluck and enterprise of those manufacturers who so continually experiment in refinements in the latest flying machines.

This rapidity of mail service and transport brings the whole world nearer together, and should make for world friendship. We are, however, beginning to realise that if the progress of flying and bombing is allowed to turn to war and not peace, then war is going to mean the extermination of whole nations. Nevertheless, may we not hope that the historian and the future will say: With the discovery of aluminium alloys for aeroplanes, wars and rumours of wars came to an end? So let the foundryman not fear to advance, believing that, just as gunpowder and cast-iron cannon sounded the death knell of knights in shining armour. So the modern flying machine, with its aluminium alloy engine, may ring not only the death knell of Kaisers and their shining swords, but may

> "Ring in the valiant man and free
> The larger heart, the kindlier hand;
> Ring out the darkness of the land,
> Ring in the Christ that is to be."

A Vote of Thanks to the President.

MR. VICTOR STOBIE (Immediate Past-President), proposing a vote of thanks to the President for his address, said it had been a delightful address, and opened up new avenues of thought. Referring to aluminium, for which he predicted a mighty future, he recalled the work of Wilm, who, when an officer in the research department of the German Army, had introduced an alloy of aluminium and magnesium which he had found possessed wonderful properties. When his report was sent to the heads of the Germany Army, however, it was turned down as being a matter of no interest. He had then resigned his commission, had joined the board at the metal factory at Duren, and duralumin was developed. That was the beginning of the aluminium era.

MR. W. D. CLEMENT (President, Wales, Monmouthshire and West of England Branch), who seconded, welcomed the President's very high conception of the importance of the foundry industry. He also took the opportunity to express, on behalf of the Branch, appreciation of the honour the Institute had conferred upon Mr. Williams by electing him President; at the same time, the members of the Branch appreciated that he was well worthy of that office. He occupied a very important position in that area of the country; the members of the Branch not only honoured and esteemed him, but had for him a large measure of affection. The more the members of the Institute generally knew of Mr. Williams the more they would like him, so that the experience in the Cardiff area would become the experience nationally.

The vote of thanks was carried with enthusiasm, and the President briefly responded.

The meeting then split into two sections for the reading and discussion of Papers.

Following the morning session, the members lunched together, and immediately afterwards parties visited the Cardiff blast furnaces of the British (Guest Keen Baldwins) Iron & Steel Company, Limited; the works of Messrs. John Williams & Sons (Cardiff), Limited; Messrs. Brown Lenox & Company, Limited, Pontypridd (steel foundry and chain manufacture), and the steel, iron and brass foundries of the Powell Duffryn Steam Coal Company, Limited, Ystrad Mynach.

Fireworks in Tin.

By "ONLOOKER."

We have seen some exciting times of late in the non-ferrous metal markets, and it looks very much as if the fun is likely to continue, for there are so many uncertainties to contend with now that the Economic Conference is in being that ups and downs are a certainty. Tin has always been regarded as the most volatile of all the markets, its high and low limits being only too often well outside the range of apparent probabilities, but recently it must be confessed that even the most-hardened operators have had cause for wonderment.

At £150 and again at £165, the original levels at which it was anticipated that the pool would begin to liquidate its holding, a great many people thought the rise had gone far enough, and it is more than probable that several bear sales were made around those figures. For the sake of those operators it is to be hoped that they were clear before the market really got the bit between its teeth, as the pace since has been such as to make it difficult to cover in shorts. As everyone knows, the pool announced its intention of not liquidating at £165, and the latest information is that sales of this 21,000-ton reserve will begin on July 1, the operation being conducted in such a way, however, as not to disturb the market. To those who may have felt some doubts about the feasibility of liquidating this metal without bringing about a setback in values, it probably came as something of a shock to learn that the second pool—a rather more unofficial affair than the first—had already been cleared without upsetting the equilibrium of the market.

Nevertheless, tin took something of a toss in mid-June after the price had climbed to £225, and with a fall of some £15 per ton it looked very much at one time as if the quotation were going back to £200, but America came to the rescue, both in the shape of a better Wall Street market and in the way of buying by consumers of tin. In any case, the setback was shortlived, and although at the time of writing the tendency is uncertain to a degree, it looks as if £200 is still rather a long way off. The rise in values during the past six weeks or so has, of course, been phenomenal, amounting to something like £60 per ton from April 30, and it is not wonderful that the more cautious operators are now taking their profits and shortening sail, in the belief that the upward swing of the pendulum has gone far enough.

Statistically, of course, tin stands better than it did, for at the end of May last the total visible supplies at 48,000 tons were 11,000 lower than a year before, stocks in this country being down by 7,000 tons to 26,800 tons. At the time of writing the June figures are not yet available, but it seems almost certain that there will be another decline in visible supplies, for American deliveries during May were close on 5,000 tons and there is every indication that June will be at least as good. In the United States tinplate mills are said to be running at from 85 to 90 per cent. of capacity, and in this country the percentage has probably risen to 70. This is very encouraging and lends colour to the belief held by some people that tin will soon reach and possibly pass the £250 mark. In any case it is not right to say that the remarkable improvement in the tin quotation is due to speculation only, for consumptive demand both in the Old World and the New has definitely gone up.

The strength of the tin position lies in the fact that production is kept down to an agreed level, at the moment 33⅓ per cent. of capacity, and although Bolivia may be giving the Producers' Association some anxiety on the score of exceeding her quota, the situation is, on the whole, well in hand. Outside production is, of course, on the up grade, and both in China and the Congo the present price is encouraging an increase in output. Later on this is going to be a factor to reckon with, and it is more than likely that an all-round speeding-up will be seen, for although £250 is not an excessive price for tin, there are very few mines that cannot earn comfortable profits at this figure. This, however, lies in the future, and for the present, with output control in force and consumption tending upwards, the outlook for tin appears to be good.

Continental Ferro-Silicon Syndicate.

EXTENSION OF AGREEMENT.

The Continental Ferro-Silicon Syndicate, of Vienna, whose agreement was due to expire at the beginning of this month, met recently at Cologne and unanimously agreed to extend the agreement for a further year. Other points, such as prices and quota allocations, are to come up for discussion shortly at a meeting to be held in Berlin.

The German section of the syndicate, which now comprises only six producers in place of seven as hitherto, has also prolonged its working arrangement for another year.

The Continental Syndicate controls the Central European market in ferro-silicon containing from 30 to 96 per cent. Si, and includes German, Scandinavian, Danish, Austrian, Jugoslav, and Swiss producers. The French producers have their own association, which operates under an agreement in accord with the Continental Syndicate.

Owing to the increased cost of raw material used in the manufacture of ferro-silicon, the French association recently advanced prices by 50 fcs. per ton. These are now :—25 per cent., 900 fcs.; 45 per cent., 1,275 fcs.; and 75 per cent., 2,300 fcs. per ton, f.o.t. destination. Concessions are being made in some cases owing to the competition of an independent maker. Ferro-silicon, 10-12 per cent., is not controlled by the association and has advanced to 560 fcs. per ton, f.o.t.

In the export market, prices are regulated by the Continental syndicate, and are much lower than the French inland prices. The demand in the Continental market has increased considerably during recent weeks, owing to the greater activity among the steelworks. The syndicate is, however, resisting all suggestions of price concessions, and it is expected that prices will shortly be raised, following the movement in the French inland market.

South Wales Institute of Engineers.

Annual Golf Meeting.

The annual golf meeting of the South Wales Institute of Engineers was held at Royal Porthcawl on Thursday, June 15. More than thirty members took part in the medal singles and medal four-baller, which constituted the programme of competition, and the day terminated in the club-house with the presentation of prizes by the Institute President, Mr. D. Morgan Rees. Mr. G. S. Mottram won the Barrington Hooper Challenge Cup, presented on behalf of THE IRON AND COAL TRADES REVIEW, and the Institute Championship Challenge Cup was won for a second time by Mr. Ivor North Lewis.

Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

Internal Chills.

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—Your contributor, Mr. Smeeton, in his article on "Prevention of Porosity in Castings," published in the issue of June 22, refers to the relative value of internal—cast in the metal section—and external—incorporated with the mould materials denseners.

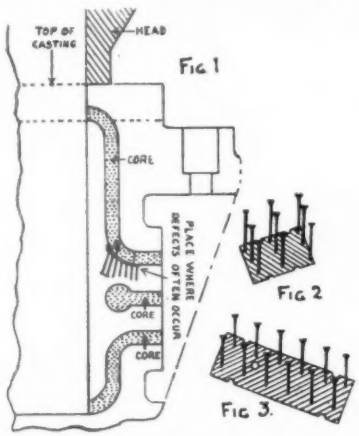


FIG 1

FIG 2

FIG 3.

Firstly, I congratulate Mr. Smeeton on his enterprise in supplying foundrymen with an excellent type of internal densener for use in eliminating porosity in certain types of castings. Secondly, the spiral-coil denseners are very successful in quite a large range of castings. We are using this type of densener in addition to many types of external and internal denseners of our own design.

It is now 20 years since I first tried to interest a British foundry equipment and supplies company in the value of internal denseners to the foundry trade. I submitted sketches and samples similar to those outlined by Mr. Smeeton and also similar to Figs. 2 and 3. Fig. 1 is an example of the use of such denseners. These illustrations were published in THE FOUNDRY TRADE JOURNAL in November, 1916, in an article which I headed with the caption "Flexible Chillers." So much for the enterprise of British foundry supplies companies.

So Mr. Smeeton will note that I have by no means confined myself to the use of external denseners as in your statement. During the past thirteen years I have contributed more than one new Paper per year on foundry practice, and with the exception of perhaps two or three Papers I make some reference to the use of both internal and external denseners.

In fact it is impossible to produce sound castings of certain types to meet the high standard required to-day without the use of various types of internal and external densener.

I also agree with Mr. Smeeton that it is impossible to eliminate porosity in castings by just metallurgical control alone. We at Craven Bros., Limited, Reddish, Manchester, practise strict metallurgical control, but we have developed a densening technique and use denseners extensively. We are thereby producing an exceedingly high-class machine-tool casting which I defy anyone to equal by metallurgical control of the metal composition alone and without employing denseners. I go further and state that with certain types of castings, and with the present-day demand for uniform and high-quality wearing surfaces, an acceptable casting could not be secured without some form of densening on vulnerable sections of grey-iron castings. This has been made more apparent by the very high standard of quality reached in such branches of engineering as the heavy machine-tool trade.

It is true that the haphazard use of denseners can make their use very hazardous. It is due to the many failures that many foundrymen condemn the use of denseners. This condemnation is due to inability or lack of desire to solve the difficulties which are real. The hazards can almost be eliminated by careful thought and foundry control.

We use tons of denseners weekly, and, with rare exceptions, we do not machine our denseners. They are better in the as-cast state.

Mr. Smeeton states that local hardness results from the application of external denseners. Generally the reverse is the fact. Look at the photomicrographs, Figs. 4, 5, 6 and 7, which were taken from a 3-in. block of cast iron densened on one face only by a 2-in. densener. Contrary to what would be expected, Figs. 4 and 5 show more cementite than Figs. 6 and 7. The photomicros. 6 and 7 were taken ½ in. from the densened surface and show a close-grained surface, and 4 and 5, 2 in. from the same surface. The analysis of the metal is as follows: T.C., 3.2; Si, 1.6; Mn, 0.65; P, 0.8; S, 0.11. Such material gives a very uniform Brinell hardness and at the same time excellent machining and finishing.

Space and time will not allow more. The technique of densening is an absorbing subject, and I wish Mr. Smeeton success in his endeavour to supply us with a useful device.—Yours, etc.,

E. LONGDEN, Foundry Manager,
Craven Bros., Limited, Manchester.

June 21, 1933.

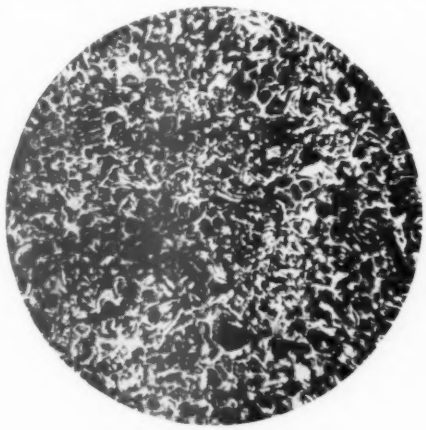


FIG. 4.—× 35.

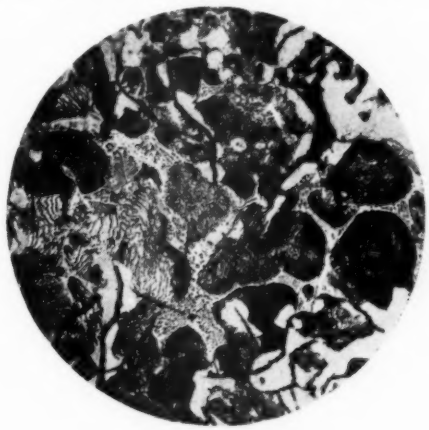


FIG. 5.—× 200.

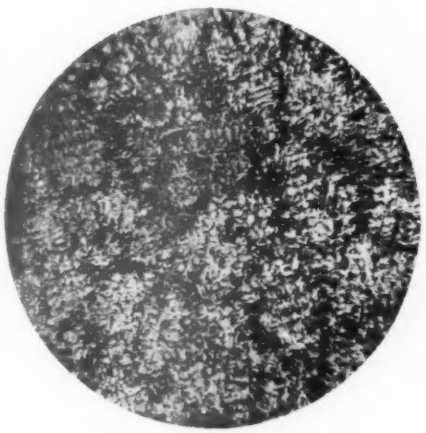


FIG. 6.—× 35.

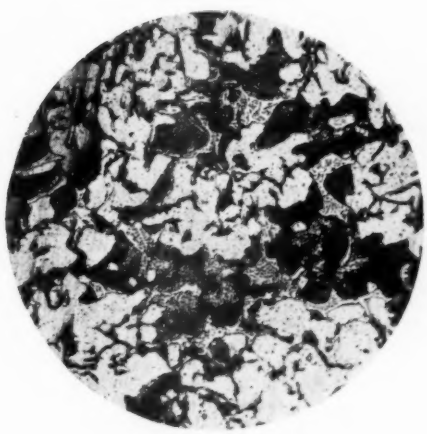


FIG. 7.—× 200.

These photomicrographs have been reduced by 25 per cent linear.

Soda Ash and Porosity.

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—With reference to the letter from Ferro Carriles de Entre Rios, published in your last issue, this does not give full details of the way in which the ground limestone was used, but there are one or two points to which attention might be given with a view to overcoming the difficulties encountered.

(1) We have found in one or two cases that people who have carried out trials without supervision have simply thrown the limestone on to the slag and immediately tried to rake it off. It is necessary, however, for the limestone to be worked into the slag with a rake: this results in a rapid and efficient thickening of the slag so that it can be easily raked off. When thickened, the slag should be in the form of dried lumps, not a thick paste, and unless this condition is reached difficulty will certainly be experienced. If there is any difficulty in getting dry lumps, it can always be overcome by adding rather more ground limestone.

(2) Can one be quite certain that they are using limestone and not burnt lime? We have recently had samples of limestone containing an appreciable quantity of burnt lime, and these usually more or less give trouble in thickening. As is well known, Buxton No. 3 ground limestone is almost entirely calcium carbonate, which appears to be the most desirable material for the purpose.

(3) After the bulk of the slag has been removed from the ladle it may be found that slight traces of fluid slag still remain, particularly round the edges of the ladle. This can be successfully held back while pouring the castings if a little dry sand is thrown on top of the metal and a skimmer used. Foundry blacking also acts quite as well as dry sand. If sufficient time is allowed for the reaction to go to completion in the ladle (4 or 5 minutes), there is no danger of the metal working after it has actually got into the mould.

Yours, etc., N. L. EVANS,
Technical Service Division.
Imperial Chemical Industries,
Limited, London.

This Week's News in Brief.

Trade Talk.

THE TWENTY-FIFTH ANNIVERSARY of the formation of the Institution of Structural Engineers was celebrated recently.

IT IS REPORTED that several consignments of steel scrap amounting to 10,000 tons have been shipped from Canada to Great Britain.

MESSRS. HARLAND & WOLFF, LIMITED, have completed a Diesel-electric locomotive for the Belfast & County Down Railway Company.

MESSRS. J. J. HARDY & SONS, LIMITED, brass-founders and engineers, of Hartlepool, are reducing their share capital from £10,000 to £5,000.

MESSRS. J. & G. FORBES, Fraserburgh, have launched the "Ave Maria," a fishing boat, for Campbeltown owners. The vessel is fitted with a crude oil engine by the Atlantic Engine Company (1920), Limited, Wishaw, and designed for a speed of not less than nine knots. She has full cruiser stern and is fitted with electric light throughout.

MESSRS. WALTER REEKIE, St. Monans, Fife, have launched the "Golden Eye," a fishing coble, for West Coast owners. The vessel is fitted with a Gardner Diesel engine, electric light and winches. The "Glen Carradale," for Mr. Laurence McBride, Carradale, was also launched. This vessel has all the most up-to-date equipment and is driven by a Kelvin Diesel engine.

AN INDICATION of the improvement in employment in Clydebank is shown by the quarterly statement dealing with charities just issued by the Singer Manufacturing Company, Limited. The amount subscribed by the firm's employees for the quarter just ended is £547 19s. 9d., compared with £447 16s. for the same period last year and with £505 11s. 9d. for last quarter.

IT IS ANNOUNCED that Messrs. Aveling & Porter and Messrs. Barford & Perkins have decided to transfer the whole of their business from Rochester to Grantham, where they have acquired a new factory on a 30-acre site, and there they will manufacture steam- and oil-driven rollers, and agricultural and heating machinery. The transfer will commence in two or three months' time.

A CONSIDERABLE AMOUNT of repair work was carried out in Clyde shipyards last week. Messrs. D. & W. Henderson & Company, Limited, had ten vessels, Messrs. Alexander Stephens & Sons, Limited, Linthouse, and Messrs. Harland & Wolff, Limited, Govan, and the Greenock Dockyard Company, Limited, each had five vessels, while the Blythswood Shipbuilding Company, Limited, continued work on the "Pacific Ranger" and the "Pacific Grove." At Dundee the Caledon Shipbuilding Company, Limited, had several vessels for overhaul and voyage repairs.

GENERAL REFRACTORIES, LIMITED, of Sheffield, announce that, largely as a result of the increased sales abroad, which the devaluation of sterling has made possible, but partly also because of a revived demand from British iron and steel works, its sales for last month constitute a record in the twenty years' history of the business. It is pleasing to note not only that all previous sales records have been broken by 15 per cent., but that all-round improved trade conditions are indicated by the fact that practically every department shows an increase.

IT IS STATED that negotiations have reached an advanced stage for the purchase of the Ormesby Ironworks at Middlesbrough, which are a unit of the Furness group of undertakings, by an iron-producing firm in the Midlands. The Ormesby Ironworks belong to Messrs. Cochrane & Company, Limited, in which control was acquired some years ago by the South Durham Steel & Iron Company, Limited. The works include a large foundry which has specialised in the production of cast-iron pipes. There are also three blast furnaces, which have been out of commission for a considerable time.

IT IS REPORTED from Brussels that the Zinc Cartel has been provisionally extended for three months to October 1 next. In the meantime the outstanding questions are to be discussed to enable the cartel to be extended for another two or three years. The zinc market is perhaps the best regulated raw materials market and by restricting production to 55 per cent., zinc stocks have been reduced by 44,000 tons, while production is still below the consumption level. Restriction in production will continue, it is stated, even if consumption should further rise, unless prices have increased accordingly.

THE LANARKSHIRE VILLAGE of Carnbroe will soon be abandoned. Scores of villagers await final notices to quit their homes, their last hope of getting work having been shattered. The works where Scotland's iron industry was founded lie overgrown with moss and weeds. The village, situated on the banks of the Calder between Coatbridge and Bellshill, was busy and prosperous until 1921, when the big strike ruined it. One after another the works of Messrs. William Dixon, Merry & Cunningham and Cairnhill works closed down, and from that day no work has been done there. The County Council, before building new houses for the displaced tenants, inquired of Messrs. Dixon as to the possibility of resumption at the works, but the firm stated that there was not the slightest possibility of ever again making iron at Carnbroe, as their production could be more than adequately covered at the Glasgow works.

BOWLING IRONWORKS, BRADFORD, established in 1784, and latterly the property of Bever, Dorling & Company, Limited, came under the auctioneer's hammer last week by order of the receiver. The highest bid for the whole of the freehold works, yards and land (an area of 23,700 sq. yds.), with travelling cranes, electric power plant and railway lines, was only £3,900, and the lot was withdrawn. The general plant and equipment was offered for sale for three days in about 680 lots. Bidding was generally slow and prices very low. Bowling Ironworks, started seven years before the famous Low Moor Ironworks, were the beginning of the Yorkshire iron trade which subsequently became noted throughout the world for something like a century, and played an important part in the industrial development of last century. The first foundry was started in 1784, four years before the ore-smelting plant. For many years the Bowling works did a big trade in domestic ovens, frying-pans, iron plates, laundry irons, posnets, boilers, and sash and clock weights. Later the undertaking turned to the making of guns and shot and shell for Trafalgar, Waterloo, Algiers, and other historic fights. Subsequently the works produced large quantities of rods and bars, boiler plates, sheet iron, factory, pumping and rolling-mill engines, steam presses and huge flywheels, etc.

New Companies.

National Scrap Metals, Limited.—Capital £7,000. Subscriber: A. Vandyk, 1, Finsbury Square, E.C.2.

Enfield Zinc Products, Limited.—Capital £6,000 in £1 shares. Subscriber: Elizabeth Watt, 31, Old Jewry, London, E.C.2.

Mercer Patents, Limited, Albion House, 59/61, New Oxford Street, London, W.C.1. Capital £100. Engineers, founders, etc. Directors: M. Lardner and A. A. Mercer.

Precision Engineering Works (Sale), Limited, 104, Harley Road, Sale.—Ironfounders, machinery manufacturers, etc. Capital £100. Directors: G. L. Harrison, G. M. Hewitt and H. Gresty.

Barking Electric Stainless Steels, Limited.—Capital £100, to manufacture in England "Carsil" electric one-process steels, direct from ores. Subscriber: R. H. T. Newman, 49, Wray Crescent, Tollington Park, London, N.4.

Company Meeting.

Platt Bros. & Company (Holdings), Limited.

SIR WALTER PRESTON, M.P. (the chairman), presided at the annual meeting of Messrs. Platt Bros. & Company (Holdings), Limited. He recalled that the company's textile-machinery making assets had been sold to Textile Machinery Makers, Limited. On the assets side of the balance sheet the value of their colliery and house properties now stood at £119,521, against £134,674 last year. The Jubilee Colliery had been closed. It had reached the age at which there was some doubt whether it could ever be operated at a profit. Some of the colliery plant had been sold, and what was worth moving had been transferred to Moston. The whole of the Jubilee Colliery surplus had been used to write down the value of Moston Colliery and it was probable that the revised book figure was considerably below the real value of their colliery and house property.

Personal.

MR. S. A. GRAYSON has joined the board of Messrs. Sanderson Bros. & Newbould, Limited, and is in charge of the works at Sheffield.

SIR ALFRED HERBERT has received the honorary freedom of the city of Coventry. Sir Alfred has been associated with the industrial life of the city for 45 years.

MAJOR CHARLES EDWARD WILLIAMS, Chief Inspecting Engineer for the Crown Agents for the Colonies, and President of the Institution of Locomotive Engineers, has been made C.B.E.

MR. JOHN DUNN has been appointed general manager of Messrs. Clelands (Successors), Limited, engineers and ship repairers, of Willington Quay-on-Tyne, in succession to Mr. G. Penny.

MR. ARTHUR H. CROWTHER, the manager for Scotland of the Gardner Diesel engine, who is particularly concerned with the application of Diesel engines to omnibuses and lorries, is an enthusiastic bowler, and has been appointed president of the Giffnock Bowling Club.

PROF. T. R. LAWSON, Head of the Department of Civil Engineering, Rensselaer Polytechnic Institute, Troy, N.Y., has been elected President of the American Society for Testing Materials, and Mr. Hermann von Schrenk, consulting timber engineer, St. Louis, Mo., has been elected Vice-President.

Contracts Open.

Peterborough, July 3.—Supply and laying of 240 yds. of 18-in. cast-iron water main, for the Corporation. The City Engineer, Broadway, Peterborough. (Fee £2 2s., returnable.)

Portsmouth, July 4.—Supply and erection of mild-steel and cast-iron fencing, for the Corporation. The City Engineer, Guildhall, Portsmouth. (Fee £1 1s., returnable.)

Singapore, August 1.—Cast-iron, spun-iron or steel pipes, for the Singapore Municipal Water Department. The Department of Overseas Trade. (Reference G.Y. 12,674.)

Christchurch, N.Z., August 8.—Metal-clad switchgear, for the Christchurch Municipal Electricity Department. The Department of Overseas Trade. (Reference A.Y. 11,841.)

Gillingham, July 8.—8,700 ft. of 9-in., 12,450 ft. of 18-in., and 12,450 ft. of 22-in. cast-iron pipes and specials, for Gillingham Town Council. Messrs. W. H. Radford & Son, Albion Chambers, King Street, Nottingham. (Fee £5 5s., returnable.)

Company Reports.

Allied Ironfounders, Limited.—Net profit, £48,151; brought in, £81,018; preference dividend for year, £52,216; carried forward, £76,953.

Edgar Allen & Company, Limited.—Net loss, £34,675; debit balance brought in, £43,150; debit balance carried forward, £77,825.

Whessoe Foundry & Engineering Company, Limited.—Trading profit, £307; transfer from internal reserves no longer required, £3,525; interest and dividends received, less interest paid, £3,145; profit on realisation of investments, £3,150; brought in, £6,305; depreciation, £6,448; for staff welfare and provident schemes, £968; income tax, £385; transferred from general reserve, £5,000; dividend of 5 per cent., £7,500; carried forward, £4,136.

Obituary.

WE REGRET TO REPORT the death of Mr. Pierre Montupet, chairman of directors of the Montupet Foundries, Chevalier of the Legion of Honour, at Nogent-sur-Oise, in his 91st year. Mr. Pierre Montupet was the father of Mr. Léon Montupet, Vice-President of the French Foundry Technical Association, President of the Aluminium Founders' Section of the Syndicat Général des Fondeurs de France. Mr. Pierre Montupet commenced his apprenticeship with his father in 1852 at the age of ten, and became at length the head of the important aluminium foundry, of international reputation, of which he was the founder together with his son and six years later Mr. Claude Primet, his son-in-law

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from the start

Care in melting is the first step to soundness in the finished aluminium casting. Hints upon this and other details of successful aluminium founding are given in our data book No. 328 ("Aluminium Foundry Data"); copy free on request.

The illustration shows a tilting furnace as used in large foundries.

B.A.Co. production includes virgin aluminium (98/99 per cent. and higher purities) in notched bars, and alloys to B.A.Co., British Standard and special specifications.

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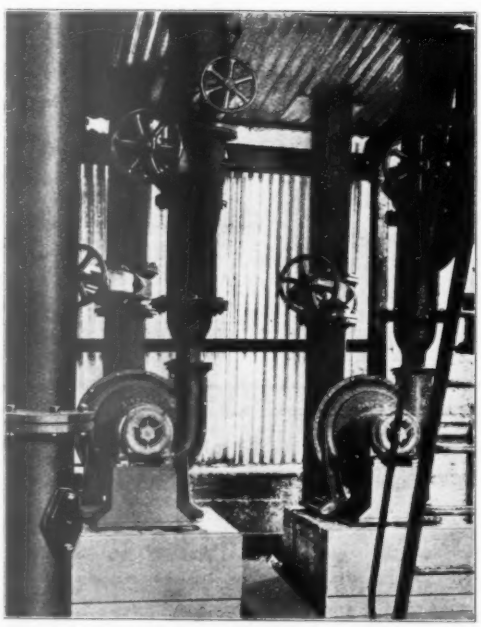

No. S.F. 26 dealing with "Sirocco" Fan Manufactures for moderate and high pressures. It includes some interesting examples of recent installations and contains detailed and accurate information concerning duties, weights and dimensions for the wide range of sizes and designs listed. In addition, numerous tables assist in determining the most suitable "Sirocco" Fan Equipment for use under diverse operating conditions.

A copy for reference is indispensable.

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Raw Material Markets.

Satisfaction is expressed that business has been well maintained in the iron and steel trades, as a falling-off is usually experienced at this season of the year. The consumption of pig-iron by the foundries remains at a steady level. Increased activity is reported at the steelworks, which have now captured the whole of the home semi-finished steel trade, since the rise in price of Continental supplies. Conditions are not quite so favourable in the finished-steel industry, but future prospects are brighter than they have been for many months past.

Pig-Iron.

MIDDLESBROUGH.—The demand for Cleveland pig-iron continues to improve, buyers now showing more disposition to enter into long-term contracts. Heavy inroads are being made into stocks, and shipments of iron from the Tees so far this month have been at the highest level seen this year. The current production is, of course, very limited, and, if the present expansion continues, one or two more blast furnaces may be relighted by the autumn. The fixed minimum prices for Cleveland iron delivered in the Middlesbrough area are:—No. 1 foundry, 65s.; No. 3 G.M.B., 62s. 6d.; No. 4 foundry and No. 4 forge iron, 61s. 6d.

Broadly speaking, although the demand for East Coast hematite is gradually improving, it is still slightly below the level of production, and slight additions to stocks at the furnaces are being made. Hence prices remain stationary at 59s. per ton for mixed numbers and 59s. 6d. for No. 1 quality, f.o.t. or f.o.b.

LANCASHIRE.—Conditions remain stationary in the pig-iron market, although there has, perhaps, been a slight lessening in the volume of new business during the past fortnight. The jobbing and light-castings foundries are somewhat better occupied, but textile-machinery makers are still poorly employed. Prices are steady, Derbyshire, Staffordshire and Cleveland makes of No. 3 being quoted for delivery to users in the Manchester area on the basis of 67s. per ton, with Northamptonshire at 65s. 6d., Derbyshire forge iron at 62s., Scottish foundry at around 80s., and East and West Coast brands of hematite iron at about 75s. and 81s. per ton, respectively.

MIDLANDS.—Local ironfounders connected with heavy engineering are poorly employed, but an expansion of activities is reported by the majority of light-castings manufacturers. There have been no alterations in foundry-iron prices, at 62s. 6d. for Northants No. 3 and 66s. for Derbyshire, Lincolnshire and North Staffordshire No. 3, including delivery to Birmingham and Black Country stations. A little No. 3 Cleveland iron comes into South Staffordshire at the same price as Derbyshire No. 3. There is a fair demand for medium and low-phosphorus grades of pig-iron, such as Scottish iron, which is quoted at about 83s. 6d. to 85s. per ton delivered. Other irons are offered at between 80s. and 90s. West Coast hematite in No. 3 or mixed numbers is controlled at 84s. 6d. per ton, but Welsh and East Coast prices are free, and quotations range from 74s. 6d. to 77s. 6d., according to tonnage and quality, delivered in the Birmingham zone.

SCOTLAND.—There is no change to report in pig-iron prices; the official minimum of 65s. for No. 3 foundry f.o.t. furnaces remains in force, with an extra of 2s. 6d. for No. 1. Middlesbrough iron is unchanged at 59s. 9d. for No. 3 f.o.t. Falkirk area and 62s. 9d. f.o.t. Glasgow area, other English irons being quoted at 57s. 6d. and 60s. 6d. per ton respectively. Activity in the Scottish foundry industry remains generally restricted, although, as is the case in other districts, the light-castings makers are showing more activity.

Coke.

Quotations remain as follows:—Best Durham foundry, 36s. 6d. to 38s.; other qualities, 2s. 6d. less; Scottish coke, 39s. to 40s.; Welsh coke, 30s. to 45s. per ton, delivered South Staffordshire. The market presents no new features. Buying by the foundries continues to be conducted on hand-to-mouth lines.

Steel.

The more cheerful conditions in the steel market which developed in May have been maintained throughout June, and in some branches of the industry a small progressive improvement is noticeable. The improvement is chiefly the result of a better home trade demand arising from the absence of serious competition from imported Continental material. In the export market the confusion incidental to the reorganisation of the Continental steelworks' sales policy, which came into operation at the beginning of June, has diverted a certain amount of business to the British works. In the semi-finished steel department the British works are taking practically all the business coming upon the British market. Continental prices plus the duty and exchange premium make business with British consumers almost impossible. The demand for finished steel material is moderately good, but some important contracts have been worked off by the British works recently, and fresh orders to take their place would be welcomed. Export business is conducted under difficult conditions; but it is considered a good sign that the orders from several oversea markets seem to be spread over a larger number of customers, although the aggregate tonnage is still rather disappointing.

Scrap.

The demand for heavy iron scrap in the Cleveland area is limited, but quotations are unchanged at 39s. per ton for ordinary metal and nearly 41s. for machinery quality. There is a steady demand for scrap in the Midlands, machinery metal being firm at 47s. 6d., delivered, and heavy pipe and plate scrap at 42s. 6d. Clean light metal is slightly weaker at 37s. 6d. In Scotland machinery cast iron is priced at 48s. 6d. to 50s., but the demand is poor. Ordinary cast is 44s. to 45s. The demand in South Wales is also very restricted. Heavy cast iron is slow at 42s. 6d. to 43s. 6d., light metal remaining at 37s. to 38s. Quotations range from 48s. to 50s. per ton for good cast-iron machinery scrap in furnace sizes.

Metals.

Copper.—In spite of a growing tendency amongst buyers to sit back and await events, there has been a fair amount of purchasing in Europe, mainly on account of the brassworks, many of which are now better occupied. Activity at the cableworks, however, is, generally speaking, still limited. Following the depreciation of the dollar, there has been an increased demand for copper in America. The market this week, while maintaining a firm undertone, has been easily moved by outside factors, fluctuations in price following movements of the exchange and of the New York markets.

Endeavours are being made at the London Conference to produce schemes for world control of supplies of staple commodities, which will, it is presumed, include copper, although the recent failure of the Copper Exporters' organisation is not a favourable augury.

The week's prices have been as follow:—

Cash.—Thursday, £36 10s. to £36 11s. 3d.; Friday, £36 6s. 3d. to £36 8s. 9d.; Monday, £36 12s. 6d. to £36 13s. 9d.; Tuesday, £37 7s. 6d. to £37 8s. 9d.; Wednesday, £37 12s. 6d. to £37 15s.

Three Months. — Thursday, £36 13s. 9d. to £36 15s.; Friday, £36 10s. to £36 11s. 3d.; Monday, £36 16s. 3d. to £36 18s. 9d.; Tuesday, £37 11s. 3d. to £37 12s. 6d.; Wednesday, £37 16s. 3d. to £37 17s. 6d.

Tin.—Conditions in this market have been very disturbed lately, and day-to-day quotations have fluctuated considerably. The continual decrease in stocks of warrant tin in England is causing anxiety with regard to future supplies. The stocks amount to about 22,000 tons, the major portion of which must be held by the International Tin Pool. The latter may commence selling before July 1, in view of the high prices now ruling.

Daily quotations:—

Cash.—Thursday, £222 7s. 6d. to £222 10s.; Friday, £219 15s. to £220; Monday, £221 to £221 5s.; Tuesday, £224 17s. 6d. to £225 2s. 6d.; Wednesday, £225 5s. to £225 10s.

Three Months. — Thursday, £221 15s. to £222; Friday, £219 to £219 5s.; Monday, £220 10s. to £220 15s.; Tuesday, £223 17s. 6d. to £224 2s. 6d.; Wednesday, £224 2s. 6d. to £224 7s. 6d.

Spelter.—Prices have improved and there has been some shortage of prompt metal. In their weekly report Messrs. Henry Gardner & Company state that "values have been quickly re-established and the backwardation and shortage of nearby metal has been further accentuated. This state of affairs is naturally causing consumers to hesitate from purchasing and consequently outside business has been quieter during the past week than previously. The advance in values, however, is the result of the tendencies which have been apparent as evidenced by the statistical position lately. Financial and other considerations apart, the rising values appear justified and rather less than might have been expected."

Price fluctuations:—

Ordinary. — Thursday, £17 2s. 6d.; Friday, £17 5s.; Monday, £17 7s. 6d.; Tuesday, £17 13s. 9d.; Wednesday, £17 18s. 9d.

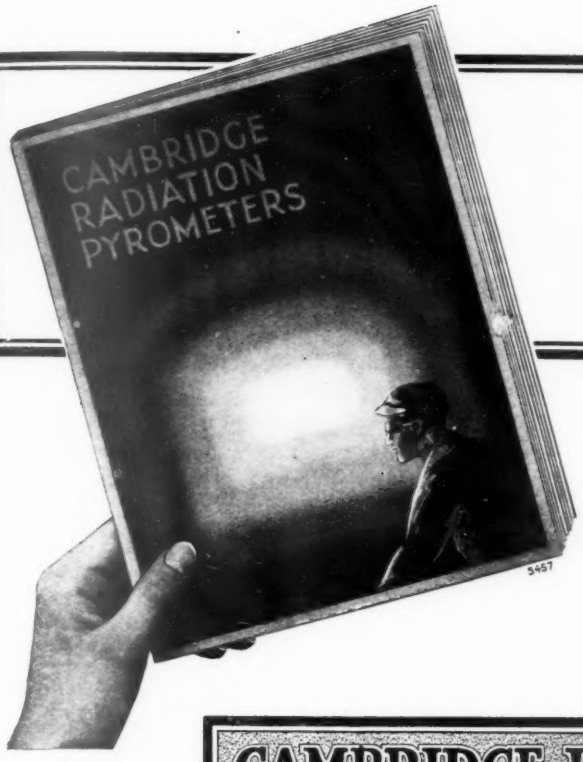
Lead.—Messrs. Brandeis, Goldschmidt & Company report that "the demand in this country as well as on the Continent has been unusually good and there is no doubt that in most branches of the industry conditions are improving. The statistics which have recently been published in America show that, despite a considerable advance in the consumption in that country, the stocks have shown a further small increase. Production has perhaps been encouraged by the prospects of a rise in the price of silver, which has been supported by the Government in their debt policy."

Daily market prices:—

Soft Foreign (Prompt).—Thursday, £13 3s. 9d.; Friday, £13 5s.; Monday, £13 8s. 9d.; Tuesday, £13 10s.; Wednesday, £13 11s. 3d.

THE BRITISH ENGINEERS' ASSOCIATION reports that the contract for the re-boilering of the Brazilian battleship "Minas Geraes" has been placed with Messrs. John I. Thornycroft & Company, Limited, for their latest type of oil-burning water-tube boilers.

CAST IRON FLANGED PIPES
2 in.—12 in. & CONNECTIONS. to 24 in. dia.
WE HAVE FIFTY-TWO YEARS OF ACCUMULATED EXPERIENCE AND METAL PATTERNS.
JAMES & RONALD RITCHIE, LTD.,
Telephone: 3852 (2 Lines). MIDDLESBROUGH. Telegrams: "Ritchie, Middlesbrough."



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CAMBRIDGE RADIATION & OPTICAL PYROMETERS

for the accurate measurement of high temperatures.

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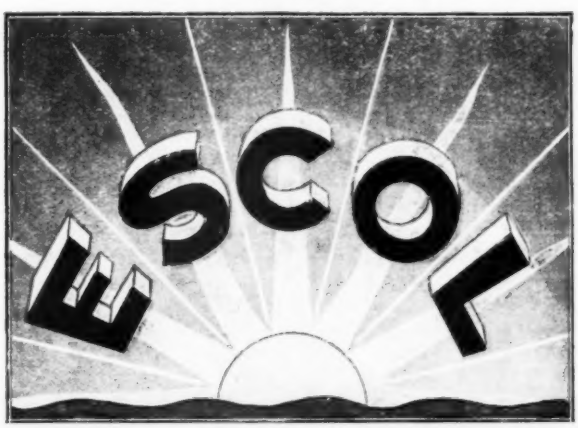
ESCOL ENAMELS ENABLE THE PRODUCTION OF HIGHEST QUALITY WARE TO BE OBTAINED WITH A MINIMUM OF OXIDES AND OPACIFIERS.



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FOR
CAST IRON AND SHEET METAL.

If you are considering the enamelling of your product—If you are at present engaged in enamelling—
WE CAN BE OF ASSISTANCE TO YOU.

Manufacturers: J. F. Stewart & Co., Ltd., Paisley Works, London, E.15.

WEEKLY PRICE CURRENT.

COPPER.

	£	s.	d.
Standard cash	37	12	6
Three months	37	16	3
Electrolytic	41	5	0
Tough	39	5	0
Best selected	39	15	0
Sheets	68	0	0
India	49	10	0
Wire bars	41	10	0
Do., July	41	12	6
Do., August	41	15	0
Ingot bars	41	10	0
H.C. wire rods	43	10	0
Off. av. cash, May	34	2	1 2/16
Do., 3 mths., May	34	6	2 9/16
Do., Sttlmnt., May	34	2	2 2/16
Do., Electro, May	38	11	4 7/16
Do., B.S., May	37	2	6
Do., wire bars, May	38	19	5 1/16
Solid drawn tubes			10½d.
Brazed tubes			10½d.
Wire			7d.

BRASS.

Solid drawn tubes	9½d.
Brazed tubes	11½d.
Rods, drawn	8½d.
Rods, extd. or rlld.	5d.
Sheets to 10 w.g.	8d.
Wire	7¾d.
Rolled metal	7¾d.
Yellow metal rods	4¾d.
Do. 4 × 4 Squares	5¾d.
Do. 4 × 3 Sheets	5¾d.

TIN.

	£	s.	d.
Standard cash	225	5	0
Three months	224	2	6
English	226	10	0
Bars	227	15	0
Straits	240	0	0
Australian (nom.)	—		
Eastern	238	15	0
Banca (nom.)	241	0	0
Off. av. cash, May	186	5	10 10/16
Do., 3 mths., May	186	13	7 1/16
Do., Sttlmt., May	186	6	8 11/16

SPELTER.

	£	s.	d.
Ordinary	17	18	9
Remelted	17	0	0
Hard	14	10	0
Electro 99.9	20	5	0
English	18	7	6
India	16	0	0
Zinc dust	20	0	0
Zinc ashes	2	15	0
Off. aver., May	15	11	7 1/16
Aver. spot, May	15	10	1 7/16

LEAD.

	£	s.	d.
Soft foreign ppt.	13	11	3
Empire	13	15	0
English	14	15	0
Off. average, May	12	4	8 2/16
Average spot, May	12	1	10 15/16

ZINC SHEETS, &c.

	£	s.	d.
Zinc sheets, English	25	5	0
Do., V.M. ex-whse.	25	0	0
Rods	30	0	0
Boiler plates	—		
Battery plates	—		

ANTIMONY.

	£	s.	d.	£	s.	d.
English	37	10	0 to	40	0	0
Chinese				27	10	0
Crude				—		

QUICKSILVER.

	£	s.	d.	£	s.	d.
Quicksilver	9	0	0 to	9	12	6

FERRO-ALLOYS AND STEEL-MAKING METALS.

Ferro silicon—	
25%	£6 10 0
45/50%	£12 10 0
75%	£18 2 6
Ferro-vanadium—	
35/50%	12/8 lb. Va.
Ferro-molybdenum—	
70/75% carbon-free of Mo.	6/3 per lb.
Ferro-titanium—	
23/25% carbon-free	9d. lb.
Ferro-phosphorus, 20/25%	£15 0 0
Ferro-tungsten—	
80/85%	1/6 lb.
Tungsten metal powder—	
98/99%	1/9 lb.
Ferro-chrome—	
2/4% car.	25 10 0
4/6% car.	21 17 6
6/8% car.	19 17 6
8/10% car.	18 17 6
Ferro-chrome—	
Max. 2% car.	30 0 0
Max. 1% car.	31 0 0
Max. 0.70% car.	42 10 0
70% carbon-free	10¾d.
Nickel—99.5/100%	£225 to £230
"F" nickel shot	£202 10 0
Ferro-cobalt	5/9 lb.
Aluminium 98/99%	£100 0 0
Metallic chromium—	
96/98%	2/8 lb.
Ferro-manganese (net)—	
76/80% loose	£10 15 0 to £11 5 0
76/80% packed	£11 15 0 to £12 5 0
76/80% export	(nom.) £9 15 0
Metallic manganese—	
94/96% carbon-free	1/2 lb.

Per ton unless otherwise stated.

HIGH-SPEED TOOL STEEL.

Finished bars, 14% tungsten	2s. 0d.
Finished bars, 18% tungsten	2s. 9d.

Per lb. net, d/d buyers' works.

Extras—	
Rounds and squares, 3 in. and over	4d. lb.
Rounds and squares, under ½ in. to ¼ in.	3d. lb.
Do., under ¼ in. to 1/16 in.	1/- lb.
Flats, ½ in. × ¼ in. to under 1 in. × ⅛ in.	3d. lb.
Do., under ½ in. × ¼ in.	1/- lb.
Bevels of approved sizes and sections	6d. lb.

Bars cut to length, 10% extra.

SCRAP.

	£	s.	d.	£	s.	d.
South Wales—						
Heavy steel				2	5	0
Bundled steel and shrngs.	1	17	6 to	2	2	6
Mixed iron and steel	2	0	0 to	2	1	0
Heavy cast iron	2	2	6 to	2	3	6
Good machinery	2	8	0 to	2	10	0
Cleveland—						
Heavy steel				2	0	0
Steel turnings				1	10	0
Cast-iron borings				1	3	0
Heavy forge				2	10	0
W.I. piling scrap				2	0	0
Cast-iron scrap	1	19	0 to	2	1	0
Midlands—						
Light cast-iron scrap				1	17	6
Heavy wrought iron				2	5	0
Steel turnings, f.o.r.				1	5	6
Scotland—						
Heavy steel	1	17	6 to	1	18	9
Ordinary cast iron	2	4	0 to	2	5	0
Engineers' turnings				1	11	9
Cast-iron borings				1	12	6
Wrought-iron piling				2	1	3
Heavy machinery	2	8	6 to	2	10	0

London—Merchants' buying prices, delivered yard.

	£	s.	d.
Copper (clean)	30	0	0
Brass	19	0	0
Lead (less usual draft)	12	0	0
Tea lead	10	0	0
Zinc	11	0	0
New aluminium cuttings	74	0	0
Braziery copper	26	0	0
Gunmetal	24	0	0
Hollow pewter	140	0	0
Shaped black pewter	100	0	0

PIG-IRON.

(f.o.t. unless otherwise stated.)

N.E. Coast (d/d Tees-side area)—	
Foundry No. 1	65/-
Foundry No. 3	62/6
,, at Falkirk	59/9
,, at Glasgow	62/9
Foundry No. 4	61/6
Forge No. 4	61/6
Hematite No. 1, f.o.t.	59/6
Hematite M/Nos., f.o.t.	59/-
N.W. Coast—	
Hem. M/Nos. d/d Glas.	68/6
,, d/d Birm.	84/6
Malleable iron d/d Birm.	115/-
Midlands (d/d Birmingham dist.)—	
Staffs No. 4 forge	62/-
,, No. 3 fdry.	66/-
Northants forge	58/6
,, fdry. No. 3	62/6
,, fdry. No. 1	65/6
Derbyshire forge	62/-
,, fdry. No. 3	66/-
,, fdry. No. 1	69/-
Scotland—	
Foundry No. 1	67/6
,, No. 3	65/-
Hem. M/Nos. d/d	66/-
Sheffield (d/d district)—	
Derby forge	59/6
,, fdry. No. 3	63/6
Lincs forge	59/6
,, fdry. No. 3	63/6
E.C. hematite	73/6
W.C. hematite	83/6
Lancashire (d/d eq. Man.)—	
Derby fdry. No. 3	67/-
Staffs fdry. No. 3	67/-
Northants fdry. No. 3	65/6
Cleveland fdry. No. 3	67/-
Dalzell, No. 3 (special)	102/6 to 105/-
Glengarnock, No. 3	82/-
Clyde, No. 3	82/-
Monkland, No. 3	82/-
Summerlee, No. 3	82/-
Eglinton, No. 3	82/-
Gartsherrie, No. 3	82/-
Shotts, No. 3	82/-

FINISHED IRON AND STEEL.

Usual district deliveries for iron; delivered consumer's station for steel.

	£	s.	d.	£	s.	d.
Iron—						
Bars (cr.)	9	0	0 to	9	15	0
Nut and bolt iron	6	15	0 to	7	10	0
Hoops	10	10	0 to	12	0	0
Marked bars (Staffs) f.o.t.				12	0	0
Gas strip	10	10	0 to	12	0	0
Bolts and nuts, ¾ in. × 4 in.				12	17	6
Steel—						
Plates, ship, etc.	8	15	0 to	8	17	6
Boiler plts.				8	5	0
Chequer plts.				10	7	6
Angles				8	7	6
Tees				9	7	6
Joists				8	15	0
Rounds and squares, 3 in. to 5½ in.				9	7	6
Rounds under 3 in. to ¾ in. (Untested)			6 17	6	& up.	
Flats—8 in. wide and over				8	12	6
,, under 8 in. and over 5 in.				8	17	6
Rails, heavy	8	5	0 to	8	10	0
Fishplates				12	0	0
Hoops (Staffs)			9 10	0	& up.	
Black sheets, 24g. (10-t. lots)				10	0	0
Galv. cor. shts. ,,				12	10	0
Galv. flat shts. ,,				13	0	0
Galv. fencing wire, 8g. plain				14	0	0
Billets, soft	5	0	0 to	5	12	6
Billets, hard	6	12	6 to	7	2	6
Sheet bars	4	15	0 to	5	2	6
Tin bars				4	15	0

PHOSPHOR BRONZE.

	Per lb. basis.
Strip	11d.
Sheet to 10 w.g.	12d.
Wire	12½d.
Rods	11d.
Tubes	15½d.
Castings	13d.

Delivery 3 cwt. free.
10% phos. cop. £30 above B.S.
15% phos. cop. £35 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. Clifford & Son, Limited.

NICKEL SILVER, &c.

	Per lb.
Ingots for raising	7d. to 1/1
Rolled—	
To 9 in. wide	1/1 to 1/7
To 12 in. wide	1/1½ to 1/7½
To 15 in. wide	1/1½ to 1/7½
To 18 in. wide	1/2 to 1/8
To 21 in. wide	1/2½ to 1/8½
To 25 in. wide	1/3 to 1/9
Ingots for spoons and forks	7d. to 1/3½
Ingots rolled to spoon size	10d. to 1/6½
Wire round—	
to 10g.	1/4½ to 1/11½

with extras according to gauge.
Special 5ths quality turning rods in straight lengths, 1/3½ upwards.

AMERICAN IRON AND STEEL.

At Pittsburgh unless otherwise stated.

	Dols.
No. 2 foundry, Phila.	16.34
No. 2 foundry, Valley	15.50
No. 2 foundry, Birm.	12.00
Basic	16.89
Bessemer	17.89
Malleable	17.39
Grey forge	17.39
Ferro-mang. 80%, seaboard	68.00
O.-h. rails, h'y, at mill	40.00
Billets	26.00
Sheet bars	26.00
Wire rods	35.00
	Cents.
Iron bars, Phila.	1.86
Steel bars	1.60
Tank plates	1.69
Beams, etc.	1.60
Skelp, grooved steel	1.60
Steel hoops	1.55
Sheets, black, No. 24	2.10
Sheets, galv., No. 24	2.70
Wire nails	1.85
Plain wire	2.10
Barbed wire, galv.	2.35
Tinplates, 100-lb. box	$4.25

COKE (at ovens).

Welsh foundry	20/- to 22/6
,, furnace	15/- to 16/-
Durham and Northumberland—	
,, foundry	21/- to 25/-
,, furnace	13/3
Midlands, foundry	—
,, furnace	—

TINPLATES.

f.o.b. Bristol Channel ports.

I.C. cokes	20×14 per box	17/3 to 17/6
,,	28×20 ,,	34/6 to 35/-
,,	20×10 ,,	24/9 to 25/3
,,	18¾×14 ,,	18/- to 18/3
C.W.	20×14 ,,	16/-
,,	28×20 ,,	33/3 to 33/6
,,	20×10 ,,	22/9
,,	18¾×14 ,,	16/6

SWEDISH CHARCOAL IRON & STEEL.

	£	s.	d.	£	s.	d.
Pig-iron	£6	0	0 to	£7	0	0
Bars-hammered, basis	£16	10	0 to	£17	0	0
Bars and nail-rods, rolled, basis	£15	17	6 to	£16	5	0
Blooms	£10	0	0 to	£12	0	0
Keg steel	£32	0	0 to	£33	0	0
Faggot steel	£18	0	0 to	£23	0	0
Bars and rods dead soft, st'l	£10	0	0 to	£12	0	0

All per English ton, f.o.b. Gothenburg.
[Subject to an exchange basis of Kr. 18.16 to £1.]

DAILY FLUCTUATIONS.

Standard Copper (cash).

		£	s.	d.	
June	22 ..	36	10	0	inc. 8/9
,,	23 ..	36	6	3	dec. 3/9
,,	26 ..	36	12	6	inc. 6/3
,,	27 ..	37	7	6	,, 15/-
,,	28 ..	37	12	6	,, 5/-

Electrolytic Copper.

		£	s.	d.	
June	22 ..	40	0	0	No change
,,	23 ..	40	0	0	,, ,,
,,	26 ..	40	10	0	inc. 10/-
,,	27 ..	41	0	0	,, 10/-
,,	28 ..	41	5	0	,, 5/-

Standard Tin (cash).

		£	s.	d.	
June	22 ..	222	7	6	inc. 40/-
,,	23 ..	219	15	0	dec. 52/6
,,	26 ..	221	0	0	inc. 25/-
,,	27 ..	224	17	6	,, 77/6
,,	28 ..	225	5	0	,, 7/6

Tin (English ingots).

		£	s.	d.	
June	22 ..	223	15	0	inc. 35/-
,,	23 ..	221	5	0	dec. 50/-
,,	26 ..	222	10	0	inc. 25/-
,,	27 ..	226	5	0	,, 75/-
,,	28 ..	226	10	0	,, 5/-

Spelter (ordinary).

		£	s.	d.	
June	22 ..	17	2	6	No change
,,	23 ..	17	5	0	inc. 2/6
,,	26 ..	17	7	6	,, 2/6
,,	27 ..	17	13	9	,, 6/3
,,	28 ..	17	18	9	,, 5/-

Spelter (Electro, 99.9 per cent.).

		£	s.	d.	
June	22 ..	19	5	0	No change
,,	23 ..	19	7	6	inc. 2/6
,,	26 ..	19	10	0	,, 2/6
,,	27 ..	20	0	0	,, 10/-
,,	28 ..	20	5	0	,, 5/-

Zinc Sheets (English).

		£	s.	d.	
June	22 ..	25	0	0	No change
,,	23 ..	25	0	0	,, ,,
,,	26 ..	25	0	0	,, ,,
,,	27 ..	25	5	0	inc. 5/-
,,	28 ..	25	5	0	No change

Lead (English).

		£	s.	d.	
June	22 ..	14	15	0	No change
,,	23 ..	14	15	0	,, ,,
,,	26 ..	14	15	0	,, ,,
,,	27 ..	14	15	0	,, ,,
,,	28 ..	14	15	0	,, ,,

AVERAGE MONTHLY PRICES OF STEEL BOILER PLATES IN ENGLAND.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly average
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1896	6 0 0	6 0 0	6 2 6	6 2 6	6 2 6	6 0 0	6 0 0	6 0 0	6 0 0	6 2 6	6 10 0	6 10 0	6 2 6
1897	6 10 0	6 10 0	6 10 0	6 7 6	6 2 6	6 2 6	6 5 0	6 0 0	6 0 0	6 0 0	6 7 6	6 10 0	6 5 5
1898	6 10 0	6 8 9	6 8 9	6 10 0	6 15 0	6 18 9	6 17 6	6 17 6	7 2 6	6 15 0	7 0 0	7 5 0	6 15 8½
1899	7 5 0	8 0 0	8 2 6	8 2 6	8 5 0	8 5 0	8 12 6	8 12 6	8 15 0	8 15 0	9 2 6	9 5 0	8 17 8½
1900	9 5 0	9 5 0	9 7 6	9 10 0	9 12 6	10 5 0	10 5 0	10 5 0	10 5 0	10 0 0	9 15 0	9 15 0	9 15 10
1901	9 5 0	9 5 0	8 15 0	8 10 0	8 10 0	7 10 0	7 15 0	7 15 0	7 15 0	7 15 0	7 15 0	7 15 0	8 3 11
1902	7 7 6	7 0 0	7 12 6	7 12 6	7 12 6	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 9 7
1903	7 10 0	7 10 0	7 15 0	7 5 0	7 5 0	7 5 0	7 5 0	7 0 0	7 0 0	7 0 0	7 0 0	6 17 6	7 3 11½
1904	6 12 6	6 15 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	6 18 11½
1905	6 17 6	6 17 6	6 17 6	6 17 6	6 17 6	6 17 6	6 17 6	6 17 6	6 10 0	7 5 0	8 0 0	8 0 0	7 1 3
1906	8 0 0	8 0 0	8 0 0	8 0 0	8 0 0	8 0 0	8 0 0	8 0 0	8 0 0	8 0 0	8 0 0	8 10 0	8 0 10
1907	8 10 0	8 10 0	8 10 0	8 10 0	8 10 0	8 10 0	8 10 0	8 10 0	8 10 0	8 10 0	8 0 0	8 0 0	8 8 4
1908	7 10 0	7 10 0	7 10 0	7 5 0	7 5 0	7 5 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	7 3 9
1909	7 0 0	7 0 0	7 0 0	7 0 0	7 0 0	6 15 0	6 15 0	6 15 0	7 0 0	7 0 0	7 0 0	7 0 0	6 18 9
1910	7 0 0	7 0 0	7 1 3	7 5 0	7 5 0	7 5 0	7 5 0	7 5 0	7 5 0	7 10 0	7 10 0	7 10 0	7 5 1
1911	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	7 14 0	7 10 4
1912	7 18 9	8 0 0	8 0 0	8 7 6	8 10 0	8 10 0	8 10 0	8 15 0	8 16 3	9 0 0	9 2 0	9 5 0	8 11 2½
1913	9 5 0	9 5 0	9 5 0	9 5 0	9 5 0	9 5 0	9 5 0	8 19 0	8 15 0	8 5 0	7 15 0	7 15 0	8 17 0
1914	7 15 0	7 15 0	7 13 9	7 10 6	7 5 0	7 5 0	7 0 0	8 0 0	8 2 6	8 5 0	8 5 0	8 5 0	7 15 11½
1915	8 14 0	9 10 0	9 17 6	10 10 0	10 10 0	11 0 0	11 0 0	11 0 0	11 0 0	11 4 0	12 0 0	13 0 0	10 15 5½
1916	13 0 0	13 0 0	13 0 0	12 15 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 12 11
1917	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0
1918	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0	12 10 0
1919	13 0 0	15 0 0	15 0 0	15 0 0	19 5 0	19 17 6	21 0 0	21 10 0	21 10 0	21 10 0	21 15 0	23 10 0	18 9 9
1920	26 0 0	28 0 0	28 5 0	28 10 0	29 5 0	30 0 0	30 0 0	30 0 0	30 10 0	31 0 0	31 0 0	31 0 0	29 9 2
1921	30 5 0	29 0 0	25 0 0	25 0 0	25 0 0	23 0 0	21 0 0	20 10 0	19 0 0	17 10 0	16 0 0	14 16 0	22 1 9
1922	14 10 0	14 10 0	14 10 0	14 10 0	14 10 0	13 1 8	13 10 0	12 15 0	12 10 0	12 10 0	12 6 0	13 0 0	13 10 9
1923	12 8 9	13 6 0	14 0 0	14 0 0	14 0 0	14 0 0	13 12 6	13 0 0	13 0 0	13 0 0	13 0 0	13 10 0	13 9 1½
1924	13 10 0	13 10 0	13 10 0	13 10 0	13 10 0	13 10 0	13 10 0	14 0 0	14 0 0	13 11 0	13 5 0	13 5 0	13 10 11
1925	13 5 0	13 5 0	13 5 0	13 1 0	12 15 0	12 15 0	12 15 0	12 15 0	12 7 6	11 14 0	11 10 0	11 10 0	12 11 5½
1926	11 10 0	11 10 0	11 10 0	11 5 0	11 5 0	11 5 0	11 5 0	11 5 0	11 5 0	11 5 0	11 5 0	11 5 0	11 6 3
1927	11 5 0	11 5 0	11 5 0	11 5 0	11 2 6	11 0 0	11 0 0	11 0 0	10 16 0	10 10 0	10 10 0	10 10 0	10 19 0½
1928	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0
1929	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 10 0	10 5 0	10 1 3	10 1 3	10 1 3	10 1 7	10 6 8½
1930	10 2 9	10 3 5½	10 3 9	10 3 6	10 2 6	10 2 6	10 2 6	10 2 2½	9 19 6	9 16 3	9 16 3	9 16 3	10 1 6½
1931	9 15 0	9 15 0	9 15 0	9 10 11	9 6 9	9 5 0	9 7 0	9 7 9½	9 8 9	9 5 9	9 5 6	9 9 6	9 9 4
1932	9 5 0	9 2 6	8 18 6	8 17 6	8 16 6½	8 16 3	8 16 3	8 16 3	8 16 3	8 16 3	8 16 3	8 16 3	8 17 10
1933	8 10 0	8 10 0	8 10 0	8 8 9	8 5 0	8 5 0	—	—	—	—	—	—	—

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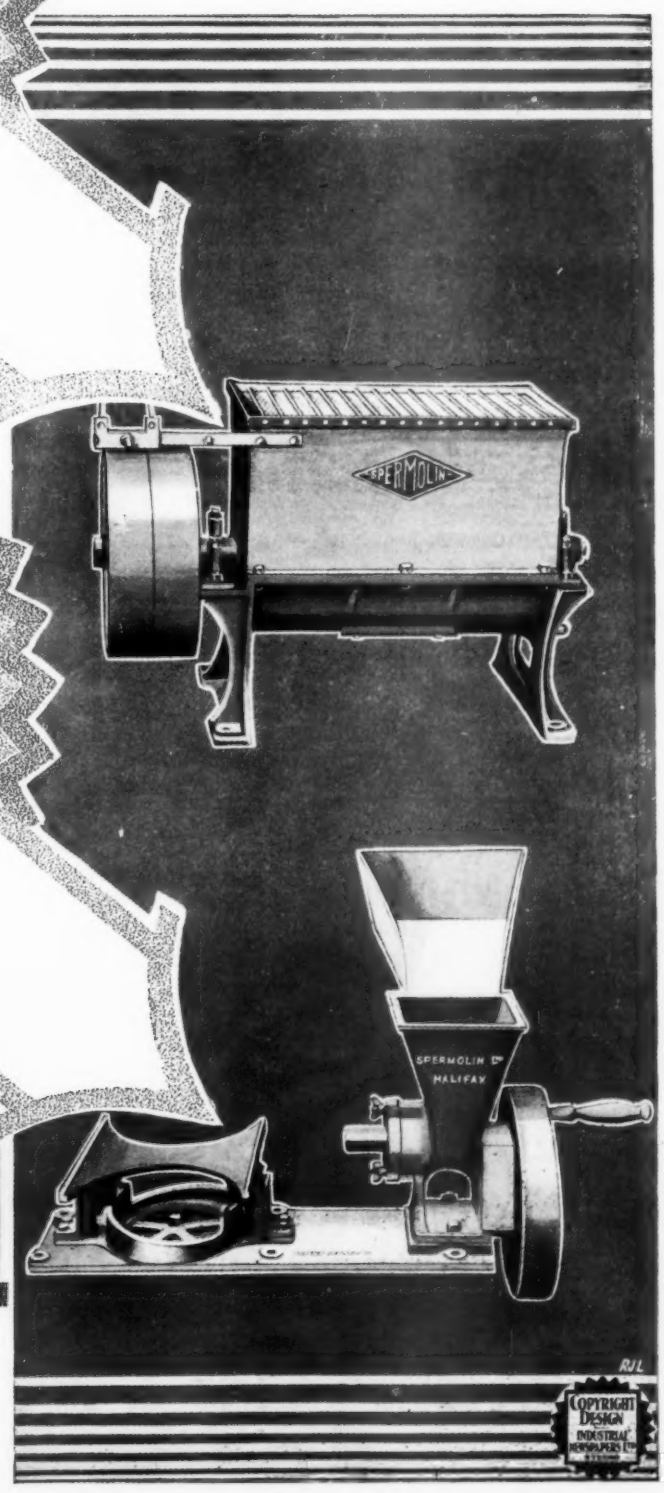

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XUM

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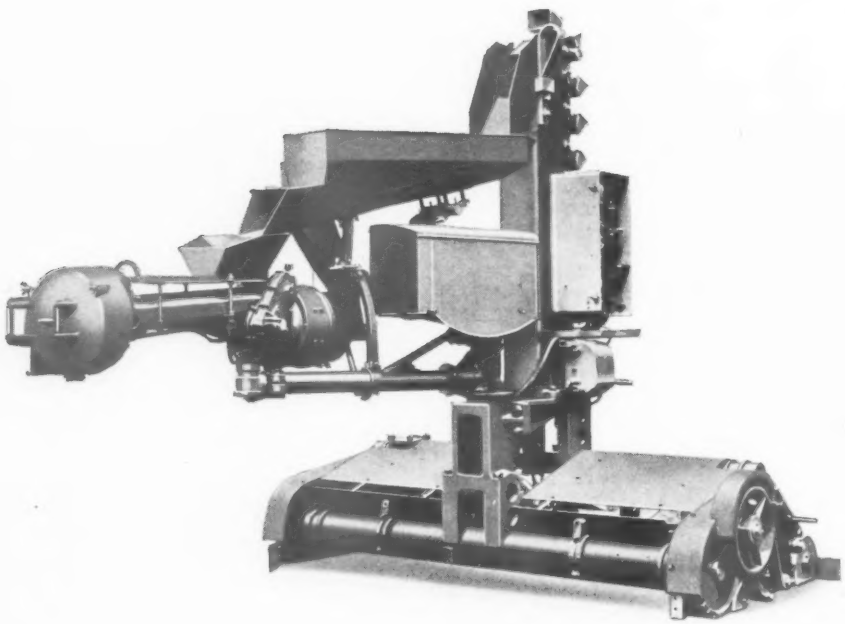

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for VITREOUS PROCESS ENAMELLING

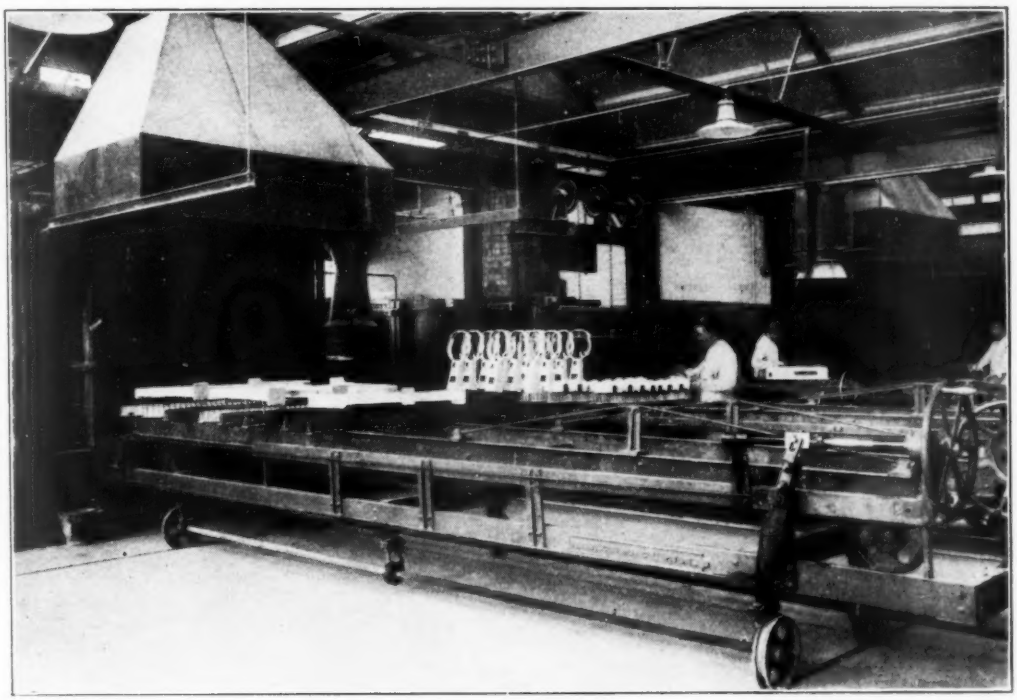

Illustration shows a battery of Oil Fired Muffle Furnaces, 12 ft. 0 in. × 4 ft. 6in. wide which operate on maximum production with a fuel consumption of 6 gallons per hour.

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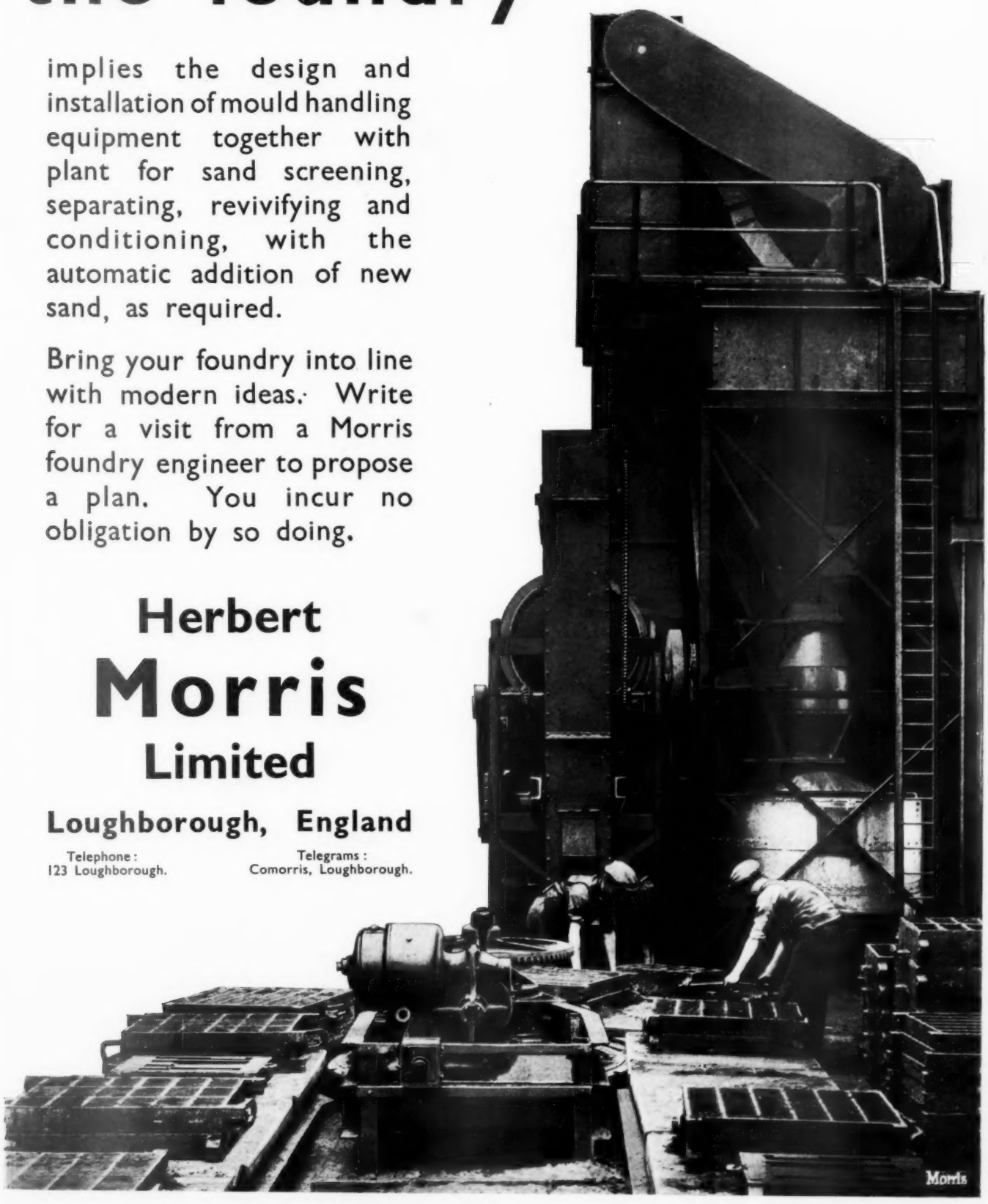

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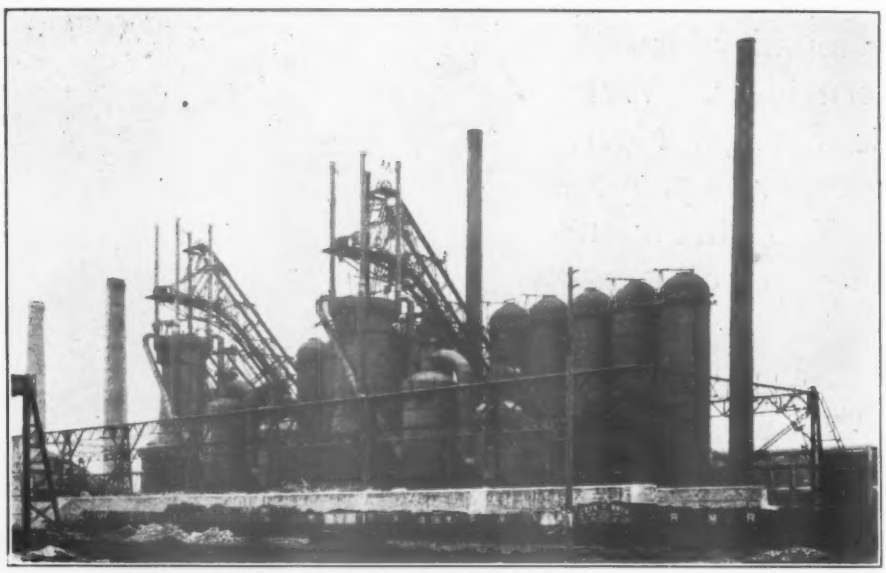

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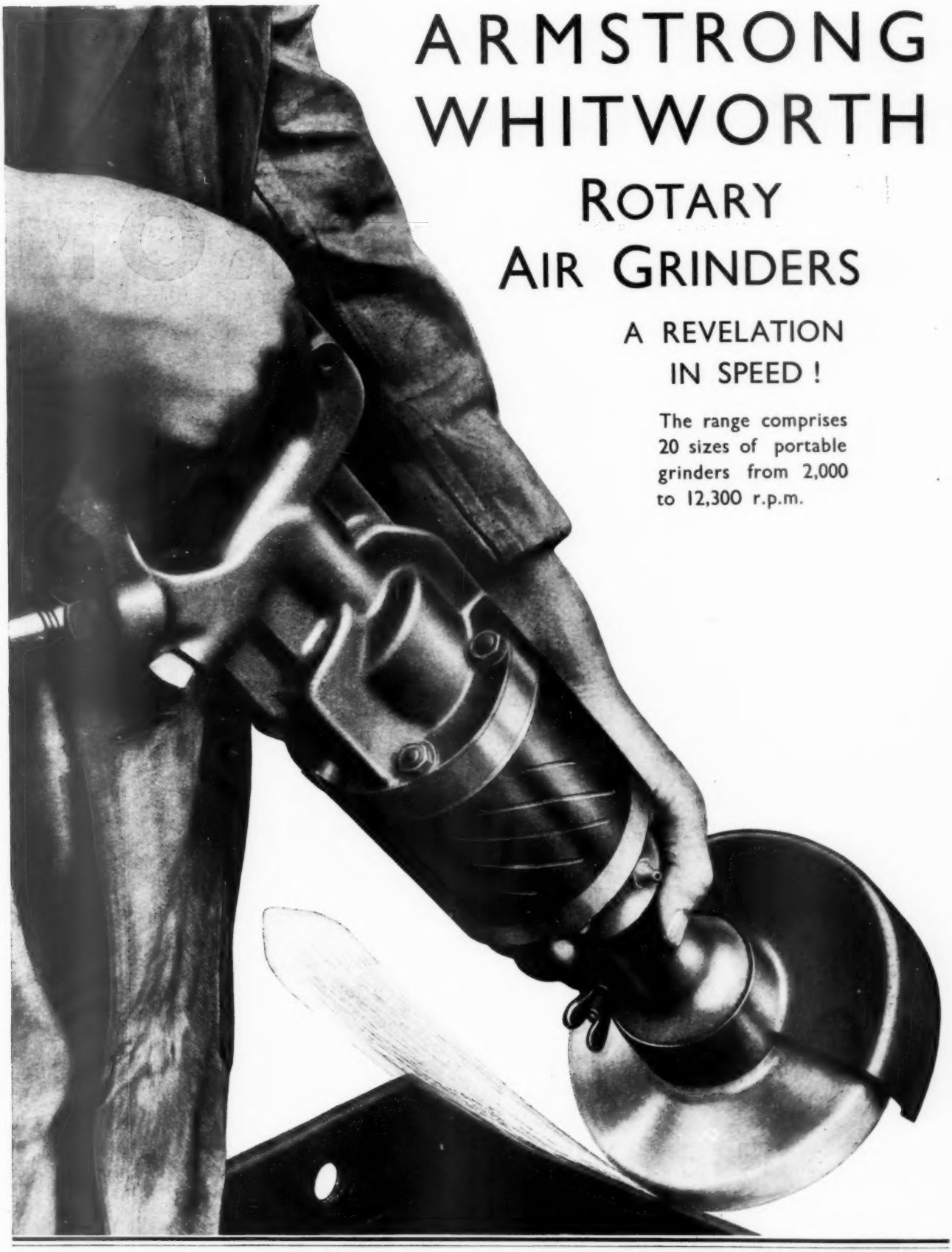

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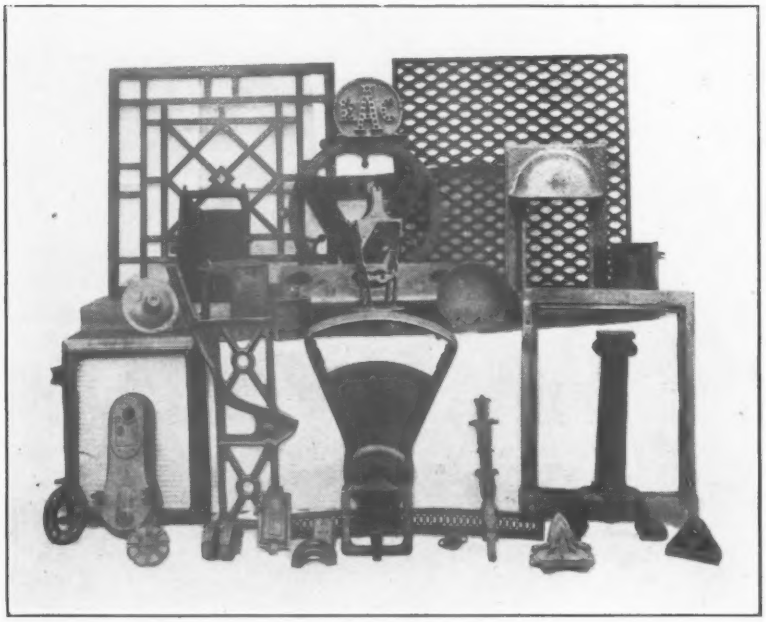

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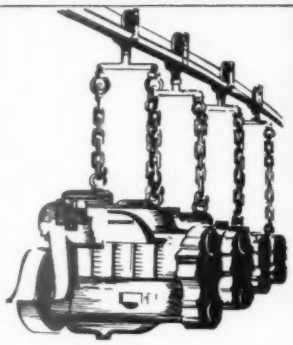

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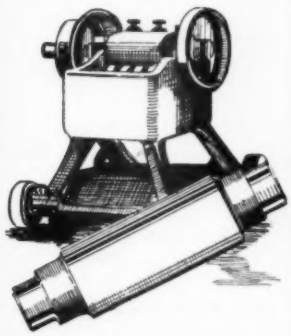

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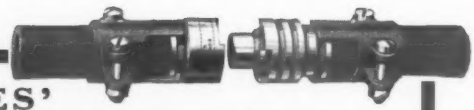

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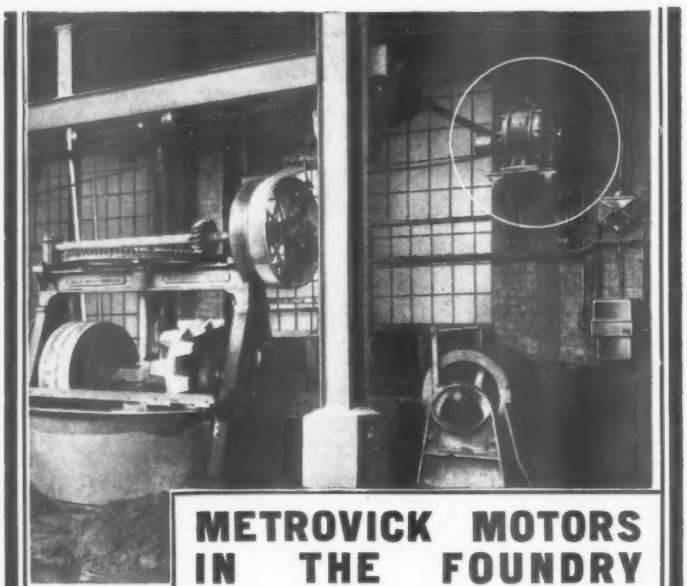

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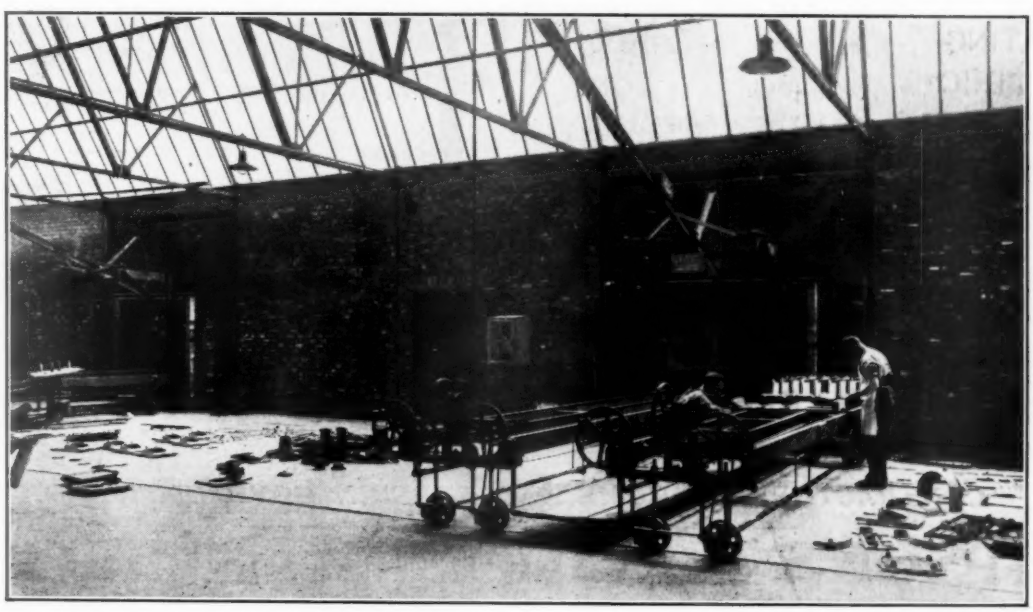

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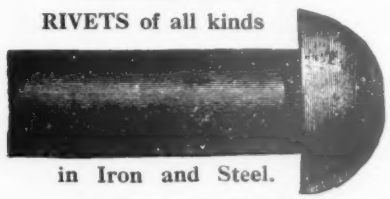

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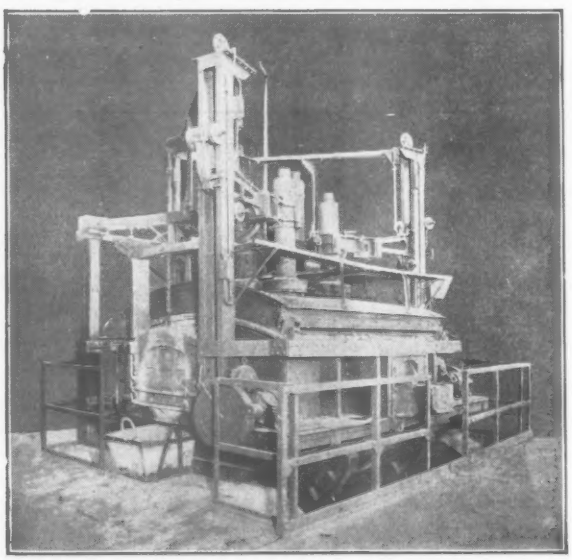

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Carbon (graphitic)	3·20	3·00	2·80	3·70	3·70	3·50	3·25	3·10	2.80
„ (combined)	0·30	0·40	0·50	0·04	0·08	0·12	0·24	0·30	0·50
Silicon	2·25 to 2·50	2·00 to 2·25	1·75 to 2·00	4·0 to 5·0	3·2 to 3·8	3·2 to 3·8	3·0 to 3·5	2·8 to 3·2	2·0 to 2·5
Sulphur	0·03	0·04	0·06	0·01	0·01	0·02	0·03	0·04	0·06 to 0·08
Phosphorus ..	0·75	0·75	0·75	1·4 to 1·5	1·4 to 1·5	1·4 to 1·5	1·4 to 1·5	1·4 to 1·5	1·4 to 1·5
Manganese ..	1·3 to 1·5	1·2 to 1·4	1·0 to 1·25	0·8 to 1·2	0·8 to 1·2	0·8 to 1·2	0·8 to 1·2	0·8 to 1·2	0·8 to 1·2

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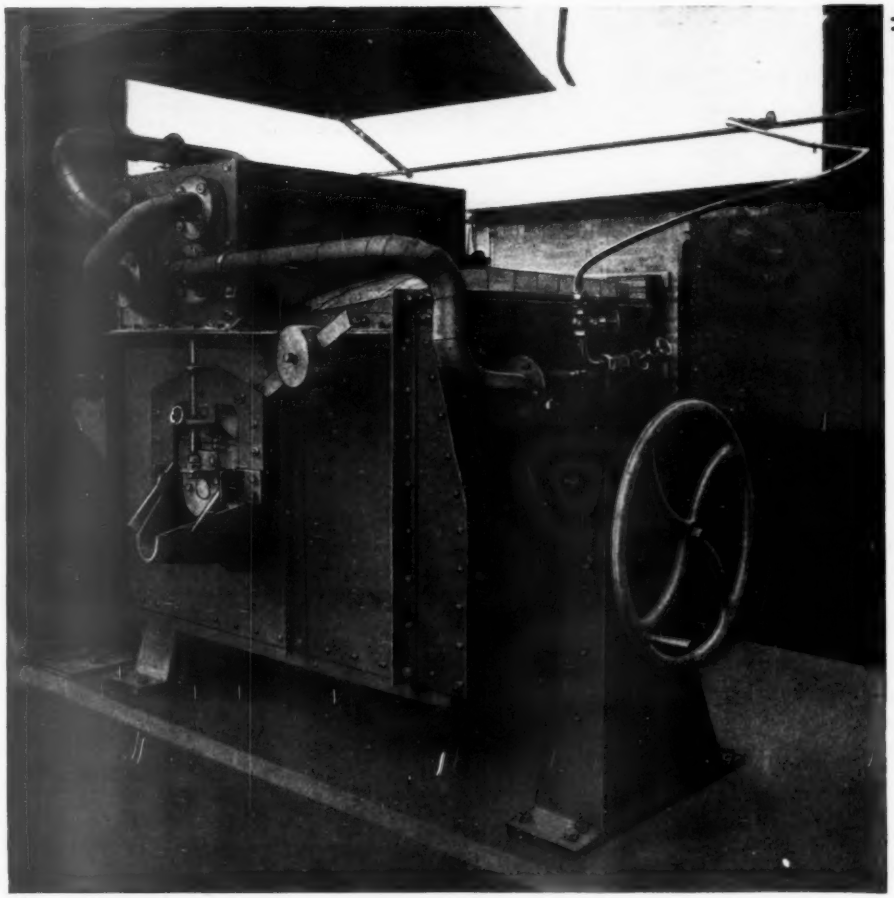

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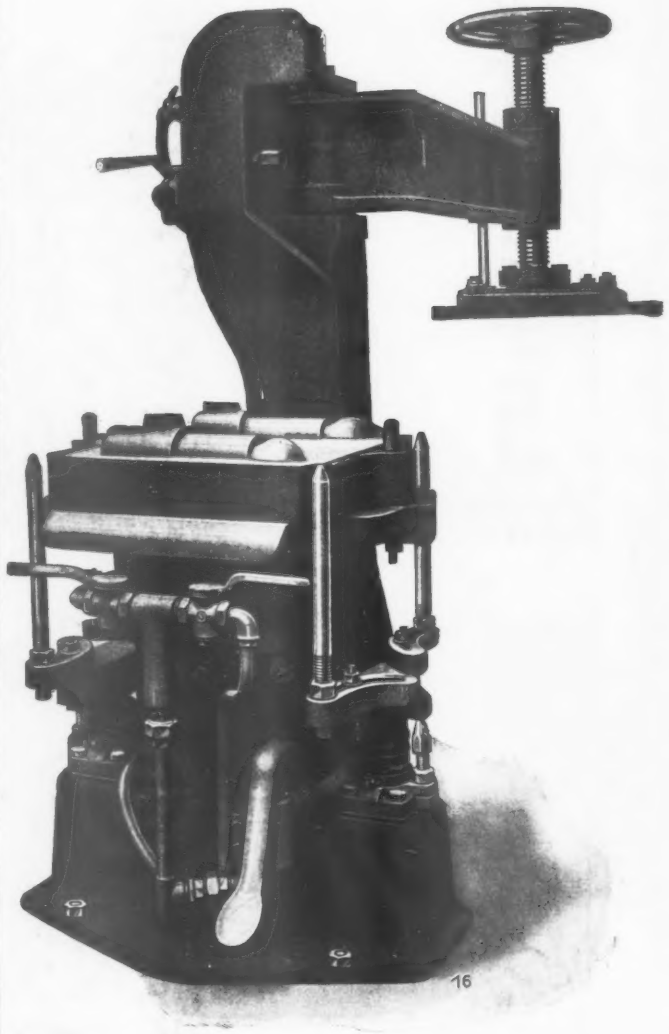

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